

CERTIFICATE OF AUTHENTICITY

THIS IS TO CERTIFY THAT THE FOLLOWING ELECTRONIC RECORDS ARE TRUE AND ACCURATE REPRODUCTIONS OF THE ORIGINAL RECORDS OF JAMES CITY COUNTY GENERAL SERVICES DEPARTMENT- STORMW ATER DIVISION; WERE SCANNED IN THE REGULAR COURSE OF BUSINESS PURSUANT TO GUIDELINES ESTABLISHED BY THE LIBRARY OF VIRGINIA AND ARCHIVES; AND HAVE BEEN VERIFIED IN THE CUSTODY OF THE INDIVIDUAL LISTED BELOW.

BMP NUMBER: YC035

DATE VERIFIED: December 31, 2019

QUALITY ASSURANCE TECHNICIAN:

Charles E. Lovett II

Charles E. Sovett IT

LOCATION: WILLIAMSBURG, VIRGINIA

NOTES: Uploaded and Certified Design Calculations and Reports



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BMP NUMBER: YC035

DATE VERIFIED: June 28, 2017

QUALITY ASSURANCE TECHNICIAN:

Jonathan Craig

LOCATION: WILLIAMSBURG, VIRGINIA

YC035_7845_RICHMOND_ROAD - 1 of 6



Stormwater Division

MEMORANDUM

DATE: June 28, 2017

SCANNER: Jonathan Craig, Assistant Environment Coordinator

RE: Files Approved for Scanning

Maintenance Agreements: YES (*in file as of scan date*)

General File ID or BMP ID: YC035

PIN: 1240200022A

Owner Name:	GORDON C. BERRYMAN AND RONALD T. CURTIS
Legal Description:	1.754 AC. LAND OF GORDON C. BERRYMAN AND RONALD T. CURTIS

Address: 7839 AND 7845 RICHMOND ROAD

Easement:

Recorded Plat:

Comments: Added maintenance agreement 060013964 dated 26 April 2006. Hard copies destroyed.

Maintenance Agreement

060013964

COUNTY OF JAMES CITY, VIRGINIA

DECLARATION OF COVENANTS

INSPECTION/MAINTENANCE OF DRAINAGE SYSTEM

Instrument No. 040031704 , and the County of James City, Virginia ("COUNTY.")

WITNESSETH:

We, the COVENANTOR(S), with full authority to execute deeds, mortgages, other covenants, and all rights, titles and interests in the property described above, do hereby covenant with the COUNTY as follows:

1. The COVENANTOR(S) shall provide maintenance for the drainage system including any runoff control facilities, conveyance systems and associated easements, hereinafter referred to as the "SYSTEM," located on and serving the above-described property to ensure that the SYSTEM is and remains in proper working condition in accordance with approved design standards, and with the law and applicable executive regulations. The SYSTEM shall not include any elements located within any Virginia Department of Transportation rights-of-way.

2. If necessary, the COVENANTOR(S) shall levy regular or special assessments against all present or subsequent owners of property served by the SYSTEM to ensure that the SYSTEM is properly maintained.

3. The COVENANTOR(S) shall provide and maintain perpetual access from public right-of-ways to the SYSTEM for the COUNTY, its agent and its contractor.

4. The COVENANTOR(S) shall grant the COUNTY, its agent and its contractor a right of entry to the SYSTEM for the purpose of inspecting, monitoring, operating, installing, constructing, reconstructing, maintaining or repairing the SYSTEM.

5. If, after reasonable notice by the COUNTY, the COVENANTOR(S) shall fail to maintain the SYSTEM in accordance with the approved design standards and with the law and applicable executive regulations, the COUNTY may perform all necessary repair or maintenance work, and the COUNTY may assess the COVENANTOR(S) and/or all property served by the SYSTEM for the cost of the work and any applicable penalties.

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б. The COVENANTOR(S) shall indemnify and save the COUNTY harmless from any and all claims for damages to persons or property arising from the installation, construction, maintenance, repair, operation or use of the SYSTEM.

The COVENANTOR(s) shall promptly notify the COUNTY when the 7. COVENANTOR(S) legally transfers any of the COVENANTOR(S)' responsibilities for the SYSTEM. The COVENANTOR(S)' shall supply the COUNTY with a copy of any document of transfer, executed by both parties.

The covenants contained herein shall run with the land and shall bind the 8. COVENANTOR(S) and the COVENANTOR(S)' heirs, executors, administrators, successors and assignees, and shall bind all present and subsequent owners of property served by the SYSTEM.

This COVENANT shall be recorded in the County Land Records. 9.

> c/Commonweath of YA Expires 10-31-09

IN WITNESS WHEREOF, the COVENANTOR(S) have executed this DECLARATION OF COVENANTS as of the date first above written.

COVENANTOR(S)

Print Name/Title Groedow C. BERRY MAN, audrer

COVENANTOR(S)

ald Curtes

ATTEST:

ATTEST: ii (Har

Print Name/Title Ronald Custis

STATE OF VIRGINIA COUNTY OF JAMES CITY, to wit: The foregoing instrument was acknowledged before me this 1st day be Ronald Curtis.

4 8. 411 Andrew Ocary Public

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My commission expires: 2/28/2010

COMMONWEALTH OF VIRGINIA

CITY/COUNTY OF le illiams b

I hereby certify that on this $\frac{1}{5}$ day of June , 2006, before the subscribed, a Notary Public for the Commonwealth of Virginia, personally appeared Gordon Berryman and did acknowledge the aforegoing instrument to be their Act.

IN WITNESS WHEREOF, I have hereunto set my hand and official seal this_ day of 20 06 June

Public

My Commission expires: October 31 2009

Approved as to form:

SAVU County Attorney

This Declaration of Covenants prepared by:

GORDON (Print Name)

120

(Phone Number)

(Address)

Ville

(City)

(Title)

VIRGINIA: CITY OF WILLIAMSBURG & COUNTY OF JAMES CITY This document was admitted to record on An/ The taxes imposed by Virginia Code Section 58.1-801, 58.1-802 & 58.1-814 have been paid. STATE TAX LOCAL TAX ADDITIONAL TAX

TESTE: BETSY B. WOOLRIDGE, CLERK

drainage1.pre

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2.

Deeds/Easements/Ag reements/Property Records

Construction Certificate



Engineering and Resource Protection Division Stormwater Management/BMP Record Drawing and Construction Certification Review Tracking Form

Project Name: County Plan No.: Stormwater Management Facility: mati (These are County assigned phasing/colors on GIS map.) BMP Phase #: Information/submittal package received. Date/By: Completeness Check: Date/By: 19407 anted Record drawing (asbuilt) Construction certification Date/By: m (Required for all BMPs after Feb 1st 2001Only RD/CC standard forms # / Date: 000139104 Insp/maint. agreement BMP Maintenance Plan Location: Other: Standard County SWPPP Notes on approved plan requiring RD/CC and/or County comment at plan review 🗆 Yes 🗆 No Location: C030 Assign County BMP ID Code #: Code: Preliminary input/log into Division's "As-Built Tracking Log" Add Location to County GIS Map. Obtain basic site information (GPIN, Owner, Address, etc.) Preliminary log into MS Access database (BMP ID #, Plan No., GPIN, Project Name, etc.) Active approved plan project file review (correspondence, H&H, design computations, etc.). Initial As-Built file setup (File label, folder, copy plan/details/design information, etc.). Inspector first check/review of RD/CC (confirmation of what was observed during inspection). Pre-inspection drawing review of the Approved Plan (Quick look prior to Field Inspection). inal inspection (FI) performed Date: Record drawing (RD) review Date: Construction certification (CC) Review Date: Actions based on reviews and inspection: No comments. Comments. Letter Forwarded. Date: Record drawing (RD) issues to resolve. Construction certification (CC) issues to resolve. Field construction-related (CR) issues to resolve. Site issues (SI) to resolve (stabilization, remove E&S measures, etc.) Other (list): Second submission: Re-inspection (if necessary): Date(s): Acceptable for SWPPP/SWM purposes (RD/CC/CR/Other). Ok to proceed w Complete "Surety Request Form". Leteased 01308 Check/Clean active file of any remaining material and finish "As-Built" file. Ok to proceed with surety release. Put final inspection report into the asbuilt file. Obtain representative digital photographs of BMP and save into County BMP Inventory electronic file. Request and obtain mylar/reproducible of asbuilt from As-Built plan preparer. Request and obtain digital file (CD-ROM, etc.) from As-Built plan preparer. Complete "As-built Tracking Log". Last check of BMP Access Database for completeness (County BMP Inventory). VSMP construction general permit, Notice-of-Termination (NOT) protocol. Final Sign-Off Inspecto Date: eleased per Date: Chief Engineer:

NVIRONMENTAL DIVISION

James City County, Virginia Environmental Division

Stormwater Management / BMP Facilities Record Drawing and Construction Certification Forms

(Note: In accordance with the requirements of the Chesapeake Bay Preservation Ordinance, Chapter 23, Section 23-10(4), BMP's shall be designed and constructed in accordance with the manual entitled James City County Guidelines for Design and Construction of Stormwater Management BMP's. Erosion and sediment control policy and approved plans generally require that at the completion of the project and prior to release of surety, an "as-built" plan prepared by a registered Professional Engineer or Certified Land Surveyor must be provided for the drainage system for the project, including any Best Management Practice (BMP) facilities. In addition, for BMP facilities involving the construction of an impounding structure or dam embankment, certification is required by a Professional Engineer who has inspected the structure during its construction. Currently there are over 20 water quality type BMP's accepted by the County.)

Section 1 - Site Information:

Project Name:	SITE PLAN	OF 7839 A	ND 7845 RICHMO	ND ROAD
Structure/BMP		N BASIN	이 영상 영상 수 있는 것	
Project Location		RICHMOND ROP	3 D	
BMP Location:			LINE OF PARCEL	
County Plan No				
Project Type:	🗖 Residential 👘 Business	Tax Map/Parcel No.:	1240200021 - 12	4020022
	S Commercial S Office	BMP ID Code (if know		
	🗇 Institutional 🗇 Industrial	Zoning District::	<u>AI-BI</u>	
	🗆 Public 🗍 Roadway	Land Use:	OFFICE / RETAIL	
	□ Other	Site Area (sf or acres):	1.75	
SOUTH 1	VESTERLY CORNER O	F THE PARC		
Nearest Visible	Landmark to SWM/BMP Facility:	NEW DEELC	= / RETAIL BUILDI	NGS
Nearest Vertical	Ground Control (if known):		장승리 중 것을 얻는 것을 얻는 것을 받는 것을 받는 것을 하는 것을 수가 있다. 이렇는 것을 수가 있는 것을 하는 것을 하는 것을 하는 것을 수가 있는 것을 수가 없다. 이렇는 것을 수가 있는 것을 수가 없는 것을 수가 있는 것을 수가 없는 것을 수가 없다. 이렇는 것을 수가 있는 것을 수가 없는 것을 수가 있는 것을 수가 없는 것을 수가 있는 것을 수가 없다. 이렇는 것을 수가 있는 것을 수가 없는 것을 수가 없는 것을 수가 없는 것을 수가 없는 것을 수가 없다. 이렇는 것을 수가 있는 것을 수가 없는 것을 수가 없는 것을 수가 없는 것을 수가 없다. 이렇는 것을 것을 수가 없는 것을 수가 없다. 이렇는 것을 것을 수가 없는 것을 수가 없다. 이렇는 것을 것을 수가 없는 것을 수가 없는 것을 수가 없는 것을 수가 없는 것을 것을 수가 없다. 이 것을 것을 것을 수가 없는 것을 것을 수가 없는 것을 것을 것을 수가 없는 것을 것을 것을 것을 수가 없다. 않는 것을 것을 것을 것을 것을 것을 것을 것을 것을 수가 없는 것을 것을 것을 것을 것을 수가 없다. 않는 것을	
	Geodetic Ground Control USG	S Temporary	C Arbitrary S Other	
Station	Number or Name:			
Datum	or Reference Elevation: 11.0	. 87		
	Description: SANITARY		UM	
	Location from Subject Facility:			A HOMINY
	D. LOCATED AT			
	LUCHIEL HS	SOUTH ENSIGN	L LOKNEL DI	IS KCO D

Section 2 - Stormwater Management / BMP Facility Construction Information:

PreConstruction Meeting Held for Construction of SWM/BMP Facility: Approx. Construction Start Date for SWM/BMP Facility:	🗆 Yes	🗆 No	Я Unknown
Facility Monitored by County Representative during Construction:		D No	🗇 Unknown
Name of Professional Firm Who Routinely Monitored Construction:			
Date of Completion for SWM/BMP Facility: 8 - 07 Date of Record Drawing/Construction Certification Submittal: 10 - 04 - 04	>7		

(Note: Record Drawing and Construction Certifications are required within thirty (30) days of the completion of Stormwater Management and/or BMP facility construction. Record Drawings and Construction Certifications must be reviewed and approved by the James City County Environmental Division prior to final inspection, acceptance and bond or surety release.)

Section 3 - Owner / Designer / Contractor Information:

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Owner/Developer:	(Note: Site Owner or Applicant responsible for development of the project.)
	Name: GORDON BERRYMAN
	Mailing Address: 124 BERKLEY LANE
	WILLIAMSBURG, VA 23185
	Business Phone: 757 - 532 - 7742 Fax: 757 - 532 - 0677
	Contact Person: Title:
Design Professional:	(Note: Professional Engineer or Certified Land Surveyor responsible for the design and
Design Frotesstonal.	preparation of plans and specifications for the Stormwater Management / BMP facility.)
	Firm Name: LANDTECH RESOURCES, INC.
	Mailing Address: SUITE ZOIA BULLEANTS BIVD.
	WILLIAMSBURG, VA Z3188
	Business Phone: 757 - 565 - 1677
	Fax: 757 · 565 - 0787
	Responsible Plan Preparer: KEN SENKINS
	Title: PROSECT ENGINEER
	Plan Name: SITE PLAN FOR 7839 AND 7845 RICHMOND ROA
	Firm's Project No. 05-001
	Plan Date: <u>3-01-05</u> Sheet No.'s Applicable to SWM/BMP Facility: <u>3 / 4 / 5 / 9 /</u>
BMP Contractor:	(Note: Site Work Contractor directly responsible for construction of the Stormwater Management / BMP facility.)
	Name: REED ENTERPRISE
	Mailing Address: 145 SAW MILL ROAD
	WILLIANS BURG VA 23188 Business Phone: 757 - 259-9011
	Fax: 157 · 282 - 2468
	Contact Person: WAYNE REED
	Site Foreman/Supervisor: WAYNE REED
	Specialty Subcontractors & Purpose (for BMP Construction Only):

Section 4 - Professional Certifications:

Certifying Professionals: (Note: A Registered Professional Engineer or Certified Land Surveyor is responsible for preparation of a Record Drawing, sometimes referred to as an As-Built plan, for the drainage system for the project including any Stormwater Management/BMP Facilities. A Registered Professional Engineer is responsible for the inspection, monitoring and certification of Stormwater Management / BMP facilities during its construction.)

Record Drawing and Construction Certifications for Stormwater Management / BMP Facilities

Record Drawing Certification

Construction Certification

Firm Name: LANDTECH RESOUTCE	S, INC Firm Name:
Mailing Address: SUITE ZOIA BULLEANTS	BLVD Mailing Address:
Williansburg VA 23488 Business Phone: 157 - 565 . 1677	
Business Phone: 157 - 565 . 1677	Business Phone:
Fax: 757 . 565 . 0782	Fax:
Name: MATTHEW H. CONNOlly	Name:
Title: PRINCIPAL	Title:
	Signature:
Date: 10-04-07	Date:

I hereby certify to the best of my knowledge and belief that this record drawing represents the actual condition of the Stormwater Management / BMP facility. The facility appears to conform with the provisions of the approved design plan, specifications and stormwater management plan, except as specifically noted. I hereby certify to the best of my knowledge and belief that this Stormwater Management/BMP facility was monitored and constructed in accordance with the provisions of the approved design plan, specifications and stormwater management plan, except as specifically noted.

lauth U (Seal)

Virginia Registered Professional Engineer or Certified Land Surveyor (Seal)

Virginia Registered Professional Engineer

Section 5 - Record Drawing and Construction Certification Requirements and Instructions:

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PreConstruction Meeting - Provides an opportunity to review SWM / BMP facility construction, maintenance and operation plans and address any questions regarding construction and/or monitoring of the structure. The design engineer, certifying professionals (if different), Owner/Applicant, Contractor and County representative(s) are encouraged to attend the preconstruction meeting. Advanced notice to the Environmental Division is requested. Usually, this requirement can be met simultaneously with Erosion and Sediment Control preconstruction meetings held for the project.

A fully completed STORMWATER MANAGEMENT / BMP FACILITIES, RECORD DRAWING and CONSTRUCTION CERTIFICATION FORM and RECORD DRAWING CHECKLIST. All applicable sections shall be completed in their entirety and certification statements signed and sealed by the registered professional responsible for individual record drawing and/or construction certification.

The Record Drawing shall be prepared by a Registered Professional Engineer or Certified Land Surveyor for the drainage system of the project including any Best Management Practices.

Construction Certification. Construction of Stormwater Management / BMP facilities which contain impoundments, embankments and related engineered appurtenances including subgrade preparation, compacted soils, structural fills, liners, geosynthetics, filters, seepage controls, cutoffs, toe drains, hydraulic flow control structures, etc. shall be visually observed and monitored by a Registered Professional Engineer or his/her authorized representative. The Engineer must certify that the structure, embankment and associated appurtenances were built in accordance with the approved design plan, specifications and stormwater management plan and standard accepted construction practice and shall submit a written certification and/or drawings to the Environmental Division as required. Soil and compaction test reports, concrete test reports, inspection reports, logs and other required construction material or installation documentation may be required by the Environmental Division to substantiate the certification, if specifically requested. The Engineer shall have the authority and responsibility to make minor changes to the approved plan, in coordination with the assigned County inspector, in order to compensate for unsafe or unusual conditions encountered during construction such as those related to bedrock, soils, groundwater, topography, etc. as long as changes do not adversely affect the integrity of the structure(s). Major changes to the approved design plan or structure must be reviewed and approved by the original design professional and the James City County Environmental Division.

Record Drawing and Construction Certifications are required within thirty (30) days of the completion of Stormwater Management / BMP facility construction. Submittals must be reviewed and accepted by James City County Environmental Division prior to final inspection, acceptance and bond/surety release.

Dual Purpose Facilities - Completion of construction also includes an interim stage for Stormwater Management / BMP facilities which serve dual purpose as temporary sediment basins during construction and as permanent stormwater management / BMP facilities following construction, once development and stabilization are substantially complete. For these dual purpose facilities, construction certification is required once the temporary sediment basin phase of construction is complete. Final record drawing and construction certification of additional permanent components is required once permanent facility construction is complete.

Interim Construction Certification is required for those dual purpose embankment-type facilities that are generally ten (10) feet or greater in dam height (*) and may not be converted, modified or begin function as a permanent SWM / BMP structure for a period generally ranging from six (6) to eighteen (18) months or more from issuance of a Land Disturbance permit for construction.

Interim or final record drawing and construction certifications are not required for temporary sediment basins which are designed and constructed in accordance with current minimum standards and specifications for temporary sediment basins per the Virginia Erosion and Sediment Control Handbook (VESCH); have a temporary service life of less than eighteen (18) months; and will be removed completely once associated disturbed areas are stabilized, <u>unless</u> a distinct hazard to the public's health, safety and welfare is determined by the Environmental Division due to the size or presence of the structure or due to evidence of improper construction.

(*Note: Dam Height as referenced above is generally defined as the vertical distance from the natural bed of the stream or waterway at the downstream toe of the embankment to the top of the embankment structure in accordance with 4VAC50-20-30, Virginia Impoundment Structure Regulations and the Virginia Dam Safety Program.)

Reco requ SWN

Record Drawings shall provide, at a minimum, all information as shown within these requirements and the attached **RECORD DRAWING CHECKLIST** specific to the type of SWM/BMP facility being constructed. Other additional record data may be formally requested by the James City County Environmental Division. (Note: Refer to the current edition of the James City County Guidelines for Design and Construction of Stormwater Management BMP's manual for a complete list of acceptable BMP's. Currently there are over 20 acceptable water quality type BMP's accepted by the County.)

Record Drawings shall consist of blue/black line prints and a reproducible (mylar, sepia, diazo, etc.) set of the approved stormwater management plan including applicable plan views, profiles, sections, details, maintenance plans, etc. as related to the subject SWM / BMP facility. The set shall indicate "RECORD DRAWING" in large text in the lower right hand corner of each sheet with record elevations, dimensions and data drawn in a clearly annotated format and/or boxed beside design values. Approved design plan values, dimensions and data shall not be removed or erased. Drawing sheet revision blocks shall be modified as required to indicate record drawing status. Elevations to the nearest 0.1' are sufficiently accurate except where higher accuracy is needed to show positive drainage. Certification statements as shown in Section 4 of the Record Drawing and Construction Certification Form, *or similar forms thereof*, and professional signatures and scals, with dates matching that of the record drawing status in the revision or title block, are also required on all associated record drawing plans, prints or reproducibles.

Submission Requirements. Initial and subsequent submissions for review shall consist of a minimum of one (1) blue/black line set for record drawings and one copy of the construction certification documents with appropriate transmittal. Under certain circumstances, it is understood that the record drawing and construction certification submissions may be performed by different professional firms. Therefore, record drawing submission may be in advance of construction certification or vice versa. Upon approval and prior to release of bond/surety, final submission shall include one (1) reproducible set of the record drawings, one (1) blue/black line set of the record drawings and one (1) copy of the construction certification. Also for current and/or future incorporation into the County BMP database and GIS system, it is requested that the record drawings also be submitted to the Environmental Division on a diskette or CD-ROM in an acceptable electronic file format such as *.dxf, *.dwg, etc. or in a standard scanned and readable format. The electronic file requirement can be discussed and coordinated with Environmental Division staff at the time of final submission.

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STORMWATER MANAGEMENT / BMP FACILITIES RECORD DRAWING CHECKLIST

(Key for Checklist is as follows: <u>XX</u> Acceptable <u>N/A</u> Not Applicable <u>Inc</u> Incomplete)

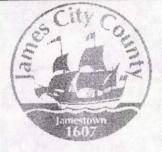
- I. <u>Methods and Presentation:</u> (Required for all Stormwater Management / BMP facilities.)
- **XX** 1. All constructed facilities meet approved design plans, unless otherwise shown. Record information or deviations from approved design plan shown in clearly annotated format and/or boxed beside design values.
- **X X** 2. Elevations to the nearest 0.1' unless higher accuracy is needed to show positive drainage.
- **X** X 3. All plan sheets labeled with "RECORD DRAWING" in large text in lower right hand corner (Approved County Plan Number and BMP ID Code can be included if known).
- **x X** 4. All plan sheet revision blocks modified to indicate date and record drawing status.
- **XX** 5. All plan sheets have certification statements and certifying professional's signature and seal.
- II. <u>Minimum Standards:</u> (Required for all Stormwater Management / BMP facilities, as applicable.)
- **XX** 1. All requirements of Section I (Methods and Presentation) apply to this section.
- **X X** 2. Plan Views: Show general location, arrangement and dimensions. Location and alignment shall generally match approved design plans.
- X X 3. Profile or elevations along top or berm of the facility. At a minimum, elevations are required at each end, at intervals not to exceed 50 feet and where low spots may be present. Top of embankment or berm elevations must be no less than design elevation plus any settlement allowances.
- **x X** 4. Top widths, berm widths and embankment side slopes.
- ★ ¥ 5. Show length, width and depth of facility or grading, contours or spot elevations as required to verify permanent pool and design storage volumes were met or were reasonably close to the approved design. Evaluation of as-built grading, contours, spot elevations, or cross-sections, may be necessary by the professional to ensure approved design configurations, depths and volumes were closely maintained. If grading or elevations are significantly different from the approved plan, the Environmental Division shall be contacted immediately to determine whether the variation is acceptable or whether further evidence will be required. Facilities which do not closely resemble approved plan grades, elevations or configurations may require regrading by the Contractor; check volumetric computations; and/or a check hydraulic routing to ensure approved design water surface elevations, discharges or freeboard were closely maintained.
- 6. Cross-section of the embankment through the principal spillway or outlet barrel. Must extend at least 100 ft. downstream of the pipe outlet or to recorded site property line, whichever is closer. Proper correlation is required between principal spillway (control structure) crest, emergency spillway crest, orifice and weirs and the top of the dam or facility. All elevations and dimensions must reasonably match the design plan or be sequentially relative to each other and the facility must reflect the required design storage volume(s) and/or design depth.
- **HA** 7. Profile or elevations along the entire centerline of the emergency spillway. Emergency spillway may be steeper, but no flatter or narrower than design.
- \searrow 8. Elevation of the principal spillway crest or outlet crest of the structure.

XX	9.	Primary control structure (riser) diameter or dimensions, height, type of material and base size. Indicate provisions for access that are present such as steps, ladders, etc.
NX	10.	Dimensions, locations and elevations of outlet orifices, weirs, slots and drains.
××	11.	Type and size of anti-vortex and trash rack device. Height, diameter, dimensions, bar spacings (if applicable) and elevations relative to the principal spillway crest. Indicate if lockable hatch is present or not.
××	12.	Type, location, size and number of anti-seep collars or documentation of other methods utilized for seepage control. May need to obtain this information during construction.
XX	13.	Top of impervious core embankment, core trench limits and elevation of cut-off trench bottom. May need to obtain this information during construction.
XX	14.	Elevation of the principal spillway barrel (outlet pipe) inlet and outlet invert.
xΥ	15.	Outlet barrel diameter, length, slope, type and thickness class of material and type of flared end sections, headwall or endwall.
NA	16.	Outfall protection dimension, type and depth of rock and if underlain filter fabric is present.
NA	17.	BMP interior and periphery landscaping zones conform with arrangements and requirements of the approved design plan.
XX	18.	Maintenance plan taken from approved design plan transposed onto record drawing set.
NA	19.	Fencing location and type, if applicable to facility.
××	20.	BMP vicinity properly cleaned of stockpiles and construction debris.
××	21.	No visual signs of erosion or channel degradation immediately downstream of facility.
××	22.	Any other information formally requested by the Environmental Division specific to the constructed SWM/BMP facility.

STORMWATER MANAGEMENT / BMP FACILITIES RECORD DRAWING CHECKLIST

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(Key)	for Check	klist is as follows: XX Acceptable	<u>N/A</u> Not Applicable	Incomplete)
V.	<u>Grou</u>	p C - Infiltration Practices		n Trench; C-2 Infiltration Trench; d C-4 Infiltration Basin)
XX	C1.	All requirements of Section II, Mi	nimum Standards, apply to	Group C facilities as applicable.
×Χ	C2.	Facility is not located on fill slope	s or on natural ground in ex	access of six (6) percent.
XX	С3.	Pretreatment devices provided prid devices include sediment forebays channels, plunge pools or other ac	, sediment basins, sediment	on facility. Acceptable pretreatment t traps, sump pits or inlets, grass
XX	C4.	Three (3) or more of the following structure: grass channel; grass filte washed bank run gravel aggregate.	r strip; bottom sand layer; a	ided to protect long term integrity of upper filter fabric layer; use of
×Χ	C5.	Sides of infiltration practice lined	with filter fabric.	
xΧ	C6.	Facility was not used for erosion an entering the facility to the greatest		es and sediment was prevented from struction.
XX	C7.	Stabilization and acceptable vegeta conveyance of stormwater to the fa		contributing drainage area prior to
χ×	C8.	Minimum one hundred (100) foot s minimum one hundred (100) foot s		n any known water supply well and v building.
**	C 9.	Minimum twenty-five (25) foot sep	paration down gradient from	n any structure.
XX	C10.	Stormwater outfalls provided for or	verflow associated with larg	ger design storms.
ХY	C11.	No visual signs of erosion or chann	el degradation immediately	downstream of facility.
X¥	C12.	Facility does not currently cause an properties.	y apparent surface or subsu	arface water problems to downgrade
XX	C13.	Observation well provided.		
×χ	C14.	Adequate, direct access provided to	the facility for future main	tenance, operation and inspection.





James City County, Virginia Environmental Division

Erosion and Sediment Control and Stormwater Management Design Plan Checklists

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V.	Additional Comments and Information	14
	Location: Dr.tr of Rt 60+ 631	
	Parcel: 1240200021 + 1240200022	
	Plan No. (if known): <u>SP-31-05</u>	
		(C-4)
	formation submitted in addition to this checklist (Check all that apply	y):
P	Design or Construction Drawings (Plans, Profiles, Details, etc.).	
Ø	Erosion & Sediment Control Plan (Plans, Details, etc.).	
2	Erosion & Sediment Control Plan Design Report.	Part of
×	Stormwater Management Design Plan (Plans, Profiles, Details, e	tc.).
A	Stormwater Management Design Report.	
A	Other, List: Varrance Reguest	
	Issue D	ate
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JAMES CITY COUNTY, VIRGINIA ENVIRONMENTAL DIVISION

EROSION AND SEDIMENT CONTROL PLAN CHECKLIST

GENERAL:

I.

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nentation Control e of James City ndbook (VESCH).
a surety are required
authority to waive ESCH deemed ly. Variances which art of the approved
Include any major
equired for utilities.
ct.
foot contour
nce with the design terns at no more
isting and proposed eplace final contours ely flat.
que vegetation areas

Yes No N/A	
¥oo	EXISTING SITE FEATURES including roads, buildings, homes, utilities, streams, fences, structures and other important surface features of the site.
₽□□	SOILS MAP with soil symbols, boundaries and legend in accordance with the current Soil Survey of James City and York Counties and the City of Williamsburg, Virginia.
\$	ENVIRONMENTAL INVENTORY in accordance with Section 23-10(2) of the Chesapeake Bay Preservation Ordinance of James City County. Inventory generally includes: tidal shores and wetlands, non-tidal wetlands, resource protection area, hydric soils and slopes steeper than 25 percent. For wetlands, provide a copy of issued permits or satisfactory evidence that appropriate permits are being pursued for the entire project.
)≶ -□ □ ⁻	100-YEAR FLOODPLAIN LIMITS or any special flood hazard areas or flood zones based on appropriate Federal Management Agency Flood Insurance Rate Maps (FIRMs) or Flood Hazard Boundary Maps (FHBMs) of James City County, Virginia.
₩-□ □	DRAINAGE AREAS for offsite and onsite areas, existing or proposed as applicable. Include drainage divides and directional labels for all subareas at points of interest and size (in acres), weighted runoff coefficient or curve number and times of concentration for each subarea.
×.	<i>CRITICAL EROSION AREAS</i> which require special consideration or unique erosion and sediment control measures. Refer to the VESCH, Chapter 6 for criteria.
ø -o o	DEVELOPMENT PLAN for the site showing all improvements such as buildings, structures, parking areas, access roadways, above and below ground utilities, stormwater management and drainage facilities, trails or sidewalks, proposed vegetation and landscaping, amenities, etc.
\$	LOCATION OF PRACTICES proposed for erosion and sediment control, tree protection and temporary stormwater management due to land disturbance activities at the site. Use standard abbreviations, labels and symbols consistent for plan views based on minimum standards and specifications in Chapter 3 of the VESCH.
ø∟o o	TEMPORARY STOCKPILE AREAS or staging and equipment storage areas as required for onsite or offsite construction activities or indicate that none are anticipated for this project.
\$ 7 🗆 🖸	OFFSITE LAND DISTURBING AREAS including borrow sites, waste areas, utility extensions, etc. and required erosion and sediment controls. If none are anticipated for the project, then indicate on the plans by general or erosion and sediment control notes.
x	DETAILS or alternately, appropriate reference to current minimum standards and specifications of the VESCH for each measure proposed for the project. Non-modified, standard duplicated details (silt fence, diversion dikes, etc.) may be referenced to the current version of the VESCH. Specific dimensional or modified standards (basins, traps, outlet protections, check dams, etc.) require presentation on detail sheets. Schedules or tables may be used for multiple site measures such as sediment traps, basins, channels, slope drains, etc. Any modification to standard details should be clearly defined, explained and illustrated.
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Yes No N/A	MAINTENANCE PLAN or alternately, appropriate reference to current minimum standards and specifications of the VESCH, outlining the inspection frequency and maintenance requirements for all erosion and sediment control measures proposed for the project.
	<i>TRENCH DEWATERING</i> methods and erosion and sediment controls, if anticipated for the project.
. ≹∕□□	CONSTRUCTION SEQUENCE outlining the anticipated sequence for installation of erosion and sediment controls and site, grading and utility work to be performed for the project by the site contractor.
▫▫⋠	<i>PHASING PLAN</i> if required for larger project sites that are to be developed in stages or phases.
\$00	STANDARD COUNTY NOTES are required to be placed on the erosion and sediment control plan. Refer to the standard James City County Erosion and Sediment Control Notes dated May 5, 1999.
\$ • •	<i>PROFESSIONAL SEAL AND SIGNATURE</i> required on final and complete approved plans, drawings, technical reports and specifications.
Ш. <u>NAR</u>	<u>RATIVE:</u>
Yes No N/A	<i>PROJECT DESCRIPTION</i> briefly describing the nature and purpose of the land disturbing activity and the acreage to be disturbed.
\$	<i>EXISTING SITE CONDITIONS</i> description of existing topography, land use, cover and drainage patterns at the site.
%	ADJACENTAREA descriptions of neighboring onsite or offsite areas such as streams, lakes, property, roads, etc. and potential impacts due to concentrated flow or runoff from the land disturbing activity.
×	OFFSITE DISTURBED AREA descriptions of proposed borrow sites, waste or surplus areas, utility extensions and erosion and sediment controls to be implemented.
)-	SOILS DESCRIPTION briefly summarizing site, disturbed area and drainage basin soils including name, unit, hydrologic soil group (HSG) classification, surface runoffpotential, erodibility, permeability, depth, texture, structure, erosion hazards, shrink-swell potential, limitations for use and anticipated depths to bedrock and the seasonal water table, as applicable.
ø-o o	<i>CRITICAL AREAS</i> on the site which many have potentially serious erosion and sediment control problems and special considerations required (ie. steep slopes, hydric soils, channels, springs, sinkholes, water supply reservoirs, groundwater recharge areas, etc.)
1. 乙胺二酸盐	이 집은 제품에서 대통령이 있는 것은 것은 것은 것을 수 없을까? 이 같이 많은 것은 것을 것을 것 같아. 이 것은 것을 것을 것을 수 있는 것을

- **PROPOSED EROSION & SEDIMENT CONTROL MEASURES** inclusive to the specific erosion and sediment control plan as proposed for the land disturbing activity. Measures should be consistent with those proposed on the site drawings. Address general use, installation, limitations, sequencing and maintenance requirements for each control measure.
- **STABILIZATION MEASURES** required for the site, either temporary or permanent, and during and following construction including temporary and permanent seeding and mulching, paving, stone, soil stabilization blankets and matting, sodding, landscaping or special stabilization techniques to be utilized at the site.
- **STORMWATER MANAGEMENT CONSIDERATIONS** for the site, either of temporary or permanent nature, and strategies, sequences and measures required for control. May reference the stormwater management plan for the site, if prepared, for permanent stormwater management facilities and control of drainage once the site is stabilized.

IV. <u>CALCULATIONS:</u>

Yes No N/A

DDX

CALCULATIONS AND COMPUTATIONS associated with hydrology, hydraulics and design of proposed temporary and permanent erosion and sediment control measures including: sediment traps and basins, diversions, stormwater conveyance channels, culverts, slope drains, outlet protections, etc. Computations are not required on the construction plan and may be attached in a supplemental erosion and sediment control plan design report, if presented in a clear and organized format.

TEMPORARY SEDIMENT BASIN DESIGN DATA SHEET submitted for each basin along with schematic or sketch cross-section showing applicable design and construction data, storage volumes (wet-dry), dimensions and elevations. Peak design runoff to be based on the 2- or 25-year design storm event based on maximum disturbed site conditions (existing, interim or proposed conditions) in accordance with Minimum Standard 3.14 of the VESCH.

JAMES CITY COUNTY, VIRGINIA ENVIRONMENTAL DIVISION

STORMWATER MANAGEMENT DESIGN PLAN CHECKLIST

I. <u>GENERAL:</u>

Yes N	o N/A	
A -0	0	<i>FAMILIARITY</i> with current versions of the James City County Guidelines for Design and Construction of Stormwater Management BMPs manual; Chapter 8, Erosion and Sediment Control and Chapter 23, Chesapeake Bay Preservation ordinances of the Code of James City County, Virginia; the Virginia Erosion and Sediment Control Handbook (VESCH); and the Virginia Stormwater Management Handbook (VSMH).
00	ø	WAIVER OR EXCEPTION if necessary, requested in writing, for the plan approving authority to waive or except the requirements of Chapter 23, Chesapeake Bay Preservation ordinance in accordance with procedure established in Sections 23-14 through 23-17 of the ordinance. Applies to this review case only.
ØC O		VARIANCE REQUEST if necessary, requested in writing for the plan approving authority to waive or modify any of the minimum standards and specifications of the VESCH deemed inappropriate based on site conditions specific to this review case only. Variances which are approved shall be properly documented in the plan and become part of the approved erosion and sediment control plan for the site.
A		PROFESSIONAL SEAL AND SIGNATURE required on final and complete approved stormwater management plans, drawings, technical reports and specifications.
¤ □	0	WORKSHEET FOR BMP POINT SYSTEM to ensure the stormwater management plan for the project attains at least 10 BMP points (New Development) or traditional pollutant load reduction computations per the Chesapeake Bay Local Assistance Manual (Redevelopment Only).
K.O	0	PROPOSED CONSERVATION EASEMENT AREAS for any natural open space points claimed in the BMP worksheet.
1	0	INSPECTION/MAINTENANCE AGREEMENT is required to be prepared and executed with the County for the project.
ø o	0	FEMA FIRM PANEL reference with designated special flood hazard areas or zone designations associated with the site, as applicable.
ØL O	0	DRAINAGE AREA MAP at a maximum scale of 1"=200' scale showing drainage area boundaries for pre- and postdevelopment conditions and associated time of concentration flow paths. Labels to include drainage area size, runoff coefficient or curve number and time of concentration for each subarea shown on the map.

8-00

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BO D

SOILS MAP with soil symbols, boundaries and legend in accordance with the current Soil Survey of James City and York Counties and the City of Williamsburg, Virginia with approximate locations of the project site, BMPs and applicable drainage basins.

STORMWATER MANAGEMENT NARRATIVE in a brief and simple format which describes the project; location; site and drainage basin soil characteristics; receiving water or drainage facility; existing site and drainage basin conditions (topography, land use, cover, slopes, etc.); proposed site development; proposed stormwater management and drainage plan including County BMP type selected; summary of hydrology and hydraulics; maintenance program; and any special assumptions utilized for development of the stormwater management and drainage design plan or computations.

TEMPORARY STORMWATER MANAGEMENT (if applicable) for control of stormwater runoff encountered during construction activities in addition to measures provided in the erosion and sediment control plan or stormwater management/drainage plan for the site. Adequate protection measures or sequencing provided.

MODIFICATION PLAN clearly defined for temporary sediment control structures which will be converted to permanent SWM/BMP structures. Includes appropriate hydrologic and hydraulic computations, conversions, sequencing and cleanout information or details. Normally related to primary control structures associated with dry detention or wet retention ponds. Normally not permitted for Group C or D categories such as bioretention, infiltration and filtering system facilities.

STORMWATER MANAGEMENT and DRAINAGE DESIGN REPORT in a bound 8-1/2 x 11 inch size format. Report shall generally include a title sheet, date, project identification, owner and preparer information, table of contents, narrative, summaries and computations as required. Computations may include: backwater, closed conduit, headwater, hydraulic, hydraulic grade line, hydrology, inlet, open channel, storm sewer, water quality, extended detention or stream channel protection and muti-stage storm routing calculations, as applicable, for the project. Computation data may include hand or computer generated computations, maps or schematics. All information should be presented in a clear, easy to follow format and should closely match construction plan information.

	성의 그 것은 것 것 같은 것 같은 것 같은 것 같은 것 같은 것 같은 것
PLAN VIEW at I	inch = 50 ft. scale or less $(1'' = 40'; 1'' = 30', etc.)$
× D D	North arrow and plan legend.
	Property lines.
A O O	Adjacent property information.
	Existing site features and existing impervious cover areas.
	Impervious cover tabulations.
	Existing drainage facilities (natural or manmade).
	Existing environmentally sensitive areas (RPA, wetlands, floodplain,
	steep slopes, critical soils, buffers, etc.).
\$ -0 0	Existing and proposed contours (1' or 2' contour interval) and spot
1	elevations as necessary to define high and low topography.
x 0 0	Existing and proposed easement locations.
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Yes No N/A	
800	Proposed site improvements and proposed impervious cover areas.
X 0 0	Proposed stormwater conveyance, drainage and management facilities with appropriate labeled construction data and information.
	Proposed landscaping and seeding plans (disturbed areas, pond interior, etc.).
A 00	Proposed slope stabilization areas (riprap, blankets, mattings, walls, etc.).
\$	Delineation of permanent pools and the 1-, 2-, 10- and 100-year Design Water Surface Elevations.
0 0 6 -	Delineation of ponding, headwater, surcharge or backwater areas which may affect adjacent existing or proposed buildings, structures or upstream adjacent properties.
X O O	Test boring locations with reference surface elevations (if known).
\$00	Risers, barrels, underdrains, overflows and outlet protections.
	Emergency spillway level section and outlet channel.
ar o o	Existing and proposed site utilities and protection measures.
	Erosion and sediment control measures (for site or BMP).
00₽	Maintenance or access corridors to permanent stormwater management, BMP or drainage facilities.

II. STORMWATER CONVEYANCE SYSTEMS:

Yes No N/A

- A D D PLAN VIEWS
 - Storm drain lengths, sizes, types, classes and slopes for all segments. Label directly on plan or use structure/pipe schedule.
 - Access structure (inlets, manholes, junctions, etc.) rim elevations, inverts, type and required grate or top unit and lengths labeled.
 - 🙇 🗆 🗖 All structure numbers labeled.
 - Adequate horizontal clearance from other site utilities or structures.
- □ □ ▶ PROFILES generally are not required but are encouraged to expedite review. If not provided, ensure all pipe segments have adequate minimum cover, do not exceed maximum depths of cover for the type/class of pipe specified and do not conflict with other site utilities or excavation areas.
- D D DETAILS
 - **V D D** Typical storm drain bedding details or reference note.
 - Standard details or reference note for all proposed access structure types (inlets, manholes, junctions, etc.).
 - ▶ □ □ Inlet shaping detail or applicable reference note.
 - ✓ □ □ Step detail or applicable reference note (if depth 4 ft. or more).
 - Typical open channel details with designation, location, shape, type, bottom width, top width, lining, slope, length, side slope, and installation depth required for construction. Channel design data as necessary may also be included.
 - Outlet protections at all pipe outfalls.

STORMWATER CONVEYANCE SYSTEM COMPUTATIONS		
100	Storm Sewer Design computations based on 10-year design event.	
	Hydraulic Grade Line computations based on 10-year design event.	
1200	Inlet computations based on current VDOT procedure for spread, ponding depth and grate size required.	
	Culvert Headwater computations. Design based on 10-year design storm event and check only for 100-year storm event.	
pto o	Open Channel computations based on 2-year design event for velocity and 10-year design event for capacity.	
X O O	Standard outlet protection or special energy dissipators.	
OOR	Pipe thickness design computations, as required, for selected pipe type (live load, minimum cover, maximum height of cover, etc.).	
DOK	Adequate channel computations for receiving channels (based on field measured channel section data).	

III. STORMWATER MANAGEMENT / BMP FACILITIES:

Yes No N/A

A-O O

HYDROLOGY - An SCS based methodology is required for the design of stormwater management/BMP facilities with watersheds exceeding 20 acres.
 Under 20 acres, other generally accepted methodologies such as the modified rational, critical storm are allowable. Refer to Chapter 5 of the VESCH or Chapter 5 of the VSMH.

- **Runoff Curve Number or Coefficient determinations: predeveloped** and ultimate development land use scenarios.
- Time of concentration: predeveloped and ultimate development indicating overland, shallow concentrated, and channel flow components (200 ft. maximum length for overland flow).
- Hydrograph generation (tabular or graphical): pre- and postdevelopment conditions for the 1-, 2-, 10-, and 100-year design storm events.

FACILITY CONFIGURATION and MINIMUM SEPARATIONS

- Screening and layout consistent with Section 24-98(d) of the Chapter 24 Zoning ordinance (landscaping, screening, visibility, etc.).
- **A D** Basic considerations for safety and unauthorized entry.
- Proper length to width ratio (Typically 2H:1V).
- □ □ □ □ ► Facilities with deep pools (4 feet or more in depth) provided with two benches. Fifteen (15) ft. safety bench outward from normal pool at maximum 6 percent slope and aquatic bench inward from normal shoreline below normal pool. Narrower widths may be considered on a case-by-case basis.
- Pond buffer minimum 25 feet outward from maximum design WSEL. Additional setbacks may be required to permanent structures.

No trees, shrubs or woody plants within 15 feet of embankment toe or 25 feet from principal spillway structure.

Infiltration and filtering system facilities generally located at least 100 feet horizontally from any water supply well; 100 feet from any downslope building; and 25 feet from any upslope buildings, unless site specific investigation allows for reduced separation.

Yes No N/A

HYDRAULIC COMPUTATIONS

- 🖻 🖸 🗖 Elevation- or Stage- Storage curve and/or tabular data.
- 🗆 🗖 🜠 Weir / Orifice Control Extended Detention.
- □ □ ☑ Weir / Orifice Control riser 1-year control for channel protection.
- □ □ 1 Weir / Orifice Control riser 2-year control for quantity (if required).
- Weir / Orifice Control riser 10-year control for quantity (if required).
- □ □ 🕰 Inlet / Outlet (barrel) control (All Storms).
- ▲ □ □ Check for barrel control prior to riser orifice flow to prevent slug flowwater hammer conditions.
- □ □ ▶ Emergency spillway capacity and depth of flow.
- Elevation Discharge (Outlet Rating) curve and/or table. Provide all supporting calculations and/or design assumptions.
- □ □ ☑ ▲ Adequate channel computations for receiving channel. May be waived if facility is designed based on current Stream Channel Protection criteria.

I D POND or RESERVOIR ROUTING

- Storage-Indication Routing of postdeveloped inflow hydrographs for the 1-, 2-, 10-, and 100-year design storms. Preference is for structure to discharge up to the 10-year storm through the principal spillway and pass the 100-year storm with a minimum 1 foot of freeboard through a combination principal and emergency spillways. If no emergency spillway is provided, riser must be large enough to pass the design high water flow and trash without overtopping the facility, have 3 square feet or more of cross-sectional area, contain a hood type inlet and have a minimum freeboard of 2 feet. Token spillways with minimum 8 ft. width are also recommended at or above the design 100-year storm elevation.
- Downstream hydrographs at established study points, if conditions warrant (ie. facility discharge combined with uncontrolled bypass).

MISCELLANEOUS COMPUTATIONS

- Water quality volume for permanent pool based on selected BMP treatment volume (WQv).
- Water quality volume for extended detention based on selected BMP treatment volume (WQv) with drawdown computations.
- Drawdown computations for the 1-year, 24 hour detention for stream channel protection criteria.
- I D D D Pond drain computations (within 24 hours).
 - Anti-seep collar design (concrete preferred) or match material type.
- I I Filter diaphragm design (or alternative method of controlling seepage).

- □ □ ▶ Riser / base structure flotation analyses. FS = 1.25 minimum.
- Downstream danger reach study and/or emergency action plan (if conditions warrant).
- Upstream backwater analyses onto offsite adjacent property (if conditions warrant).
- 🕱 🗖 🗖 100 year floodplain impacts (if conditions warrant).

Yes No N/A

GEOTECHNICAL REQUIREMENTS

- Geotechnical Report with recommendations specific to BMP facility type selected. Report prepared by a registered professional engineer. Requires submission, review and approval prior to issuance of Land Disturbance Permit.
- ✓□ □ Initial Feasibility Testing requirements satisfied as per Appendix E of the James City County Guidelines for Design and Construction of Stormwater Management BMPs manual. (Infiltration, Bioretention and Filtering System BMP types only).
- Concept Design Testing requirements satisfied as per Appendix E of the James City County Guidelines for Design and Construction of Stormwater Management BMPs manual. (Infiltration, Bioretention and Filtering System BMP types only).
- Minimum Boring locations: borrow area, pool area, principal control structure, top of facility near one abutment and emergency spillway if provided.
- Boring logs with Unified Soil Classification (ASTM D2487), soils descriptions and depths to bedrock and the seasonal water table indicated.
- Standard County Record Drawing/Construction Certification note provided on plan. Note: It is understood that preparation of record drawings and construction certifications as required for project facilities may not necessarily be performed by the plan preparer. These components may be performed by others.

PRINCIPAL SPILLWAY PROFILE AND ASSOCIATED DETAILS

EXISTING GROUND AND PROPOSED GRADE

- Embankment or excavation side slopes labeled (3H:1V maximum).
- Minimum top width labeled (per VESCH or VSMH requirements).
- Removal of unsuitable material under proposed facility (per Geotechnical Report requirements).

V

	CORE TRENCH

- A D Material (per plan or Geotechnical Report).
- Bottom width (4' minimum or greater as dictated by Geotechnical Report recommendations).
- Side slopes (1:1 maximum steepness)
- Depth (4' minimum or greater as dictated by Geotechnical Report).

PRINCIPAL CONTROL STRUCTURE. RISER OR SIMILAR STRUCTURE (DETAILS REQUIRED FOR ALL ITEMS)

- Durable, watertight, resistant material (concrete preferred).
- **B D Riser diameter is at least 1.25 times larger than barrel** diameter!
- All pertinent dimensions and elevations shown.
- **M** Control orifice or weir dimensions and elevations shown.
- □ □ 🖾 Trash rack removable for each release.
- □ □ ▶ Anti-vortex device, baffle or plate.
- **Riser base structure with dimensions and embedment** specifications (concrete preferred).
- ▲ □ □ Interior access (steps, ladders, etc.) for maintenance for structures over 4 feet in height. Excessively high risers may need some form of exterior access on top portion.
- □ □ 🎽 Low flow orifice with trash rack device.

🗭 🗖 🗖 PRINCIPAL CONTROL STRUCTURE OUTLET BARREL

- Material (ASTM C-361 reinforced concrete pipe) with watertight joints. Prior approval required for all other pipe material (other RCP types, CMP, CPP, PVC, etc.).
- □ □ № Support and bedding requirements for barrel concrete cradles, etc. or as recommended by the Geotechnical Report.
- D D Pipe inverts, length, size, class and slope shown.
- I I Flared end section or endwall provided on barrel outlet.

□ □ 🖾 SEEPAGE CONTROL

- □ □ ▲ Phreatic line shown (4:1 slope measured from the intersection of the embankment and the principal spillway design high water).
- □ □ 🖬 ANTI-SEEP COLLARS

Anti-seep collar, concrete preferred.
Size - 15 percent increase in length of
saturation using outside pipe diameter.
Spacing and location on barrel (located at
least 2 feet from a pipe joint).

□ □ ♀ FILTER DIAPHRAGMS

Design based on latest NRCS design methods and certified by a professional engineer.

Yes No N/A

- 😰 🗖 🗖 ELEVATION AND DIMENSIONAL DESIGN DATA
 - Top of facility construction height and settled height (10 percent settlement).
 - Crest of principal control structure spillway at least one (1) foot below crest of emergency spillway, if provided.

 - □ □ ∞ Minimum freeboard of two (2) feet above the 100-year design high water elevation for facilities without an emergency spillway or in accordance with the SCS National Engineering Handbook (prior approval required).
 - Basin Sediment Clean-Out elevation (permanent mode).
 Typically 10 to 25 percent of water quality volume.

CROSS SECTION THROUGH FACILITY

- Existing Ground.
- Proposed grade.
- \square \square Top of facility constructed and settled.
- □ □ ▶ Location of emergency spillway with side slopes labeled (emergency spillway in cut).
- ▶ □ □ Bottom of core trench (4' minimum).
- **I** D Location of each soil boring.
- Barrel location.
- □ □ ☑ Existing and proposed utility location/protection.

EMERGENCY SPILLWAY PROFILE

- □ □ 🗗 Existing ground.
- □ □ 🔯 Inlet, level (control) and outlet sections per SCS.
- □ □ ☑ Spillway and crest elevations.

PRETREATMENT DEVICES of adequate depth and properly designed using required pretreatment volumes for the selected County BMP facility type. Including, but not limited to: sediment forebays, sediment basins, sumps, grass channels, gravel diaphragms, plunge pools, chamber separators, manufactured systems or other acceptable methods.

- CONSTRUCTION SPECIFICATIONS and NOTES Anticipated sequence of construction for BMP (consistent with erosion and sediment control plan). Provisions to control base stream or storm flow conditions encountered during construction. Site and subgrade preparation requirements. Embankment, fill and backfill material soil and placement (lift) thickness requirements. Compaction and soil moisture content requirements. Geosynthetics for drainage, filtration, moisture barrier, separation, and reinforcement purposes. Clay or synthetic (PVC or HDPE) pond liners. Storm drain, underdrain and pipe conduit requirements. Minimum depth of pipe cover for temporary (construction) and final cover conditions. Permanent shutoff valve and pond drain. R D D Concrete requirements for structural components.
 - A D D Riprap and slope protection.
 - Access or maintenance road surface, base, subbase.
 - Temporary and permanent stabilization measures.
 - Temporary or permanent safety fencing.
 - BMP Landscaping (deep, shallow, fringe, perimeter, etc.)
 - Dust and traffic control (if warranted).
 - 900 Construction monitoring and certification by professional.
 - Other: Other:

MAINTENANCE PROVISIONS

- ----Entity responsible for maintenance identified..
- 800 Maintenance Plan which outlines the long-term schedule for inspection/maintenance of the facility and forebays
- Maintenance access from public right-of-way or publicly traveled road.
- DOR Maintenance easement provided encompassing high water pool and buffer, principal and emergency spillways, outlet structures, forebays, embankment area and possible sediment-removal stockpile areas.
- 12-0 11 Minimum 6 foot wide public safety shelf (landing) or alternative fencing.

IV. <u>OUTLET PROTECTIONS:</u>

Yes No N/A	
	Sized for maximum design release (generally 10-year storm).
	Flared end section or endwall.
	Dimensions.
	Rock or riprap size, quantity and placement thickness.
	Slope at 0 percent (Level Grade).
	Geotextiles (nonwoven).
	Special energy dissipators are required for design discharge velocities
	that exceed eighteen (18) feet per second; or if use of standard outlet protection would result in velocities exceeding permissible channe
	velocities; or if space restricts or limits their use.

V. ADDITIONAL COMMENTS OR INFORMATION SPECIFIC TO THE PLAN: An underdrain was not provided for the infiltration basin since the soil profile used for the basin floor is been than the existing grouty stormwater outfall.

Plan Preparer: Konnerffend Date: 3/15/05

SWMProg/BMP/Checklist/ChkList

Record Drawing (asbuilt plan)

Construction Drawings

6. Design Calculations



Erosion and Sediment Control Narrative

for

7839 & 7845 Richmond Rd.

March 15, 2005 Revised June 2, 2005 Revised July, 21 2005

Project Number 05-001

51-31-05

LandTech Resources, Inc. 5810-F Mooretown Road, Williamsburg, VA Phone 757-565-1677 Fax 757-565-0782

Erosion and Sediment Control Narrative

for

7839 & 7845 Richmond Rd.

March 15, 2005 Revised June 2, 2005 Revised July, 21 2005

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LandTech Resources, Inc. 5810-F Mooretown Road, Williamsburg, VA Phone 757-565-1677 Fax 757-565-0782

TABLE OF CONTENTS

SECTION

PROJECT DESCRIPTION

EXISTING CONDITIONS

ADJACENT AREAS

OFF-SITE AREA

SOILS

Slagle fine sandy loam (29B) Suffolk fine sandy loam (31B)

CRITICAL EROSION AREAS

EROSION AND SEDIMENT CONTROL MEASURES

STRUCTURAL PRACTICES

Temporary Stone Construction Entrance -3.02Silt Fence -3.05Storm Drain Inlet Protection -3.07Culvert Inlet Protection -3.08Temporary Diversion Dike -3.09Temporary Sediment Trap -3.13Outlet Protection -3.18Rock Check Dam -3.20Soil Stabilization Blankets and Matting -3.36Tree Preservation and Protection -3.38Dust Control -3.39

VEGETATIVE PRACTICES

Permanent Seeding – 3.32

MANAGEMENT STRATEGIES

PERMANENT STABILIZATION

STORMWATER MANAGEMENT

CALCULATIONS

MAINTENANCE

Temporary Stone Construction Entrance – 3.02 Silt Fence – 3.05 Storm Drain Inlet Protection – 3.07 Culvert Inlet Protection – 3.08 Temporary Diversion Dike – 3.09 Temporary Sediment Trap – 3.13 Rock Check Dam – 3.20 Permanent Seeding – 3.32 Soil Stabilization Blankets and Matting – 3.36

APPENDICES

BMP Design, Storm Sewer System Design
and Special Stormwater CriteriaAPPENDIX ASediment Trap DesignAPPENDIX BReport of Subsurface Investigation and
Geotechnical Engineering ServicesAPPENDIX C

PROJECT DESCRIPTION

The project consists of the construction of two office/retail buildings totaling 10,000 sf at 7839 & 7845 Richmond Road in James City County, Virginia. The site is 1.75 acres with a total of 0.70 acres to be covered by impervious surfaces after construction is complete. The total disturbed area is approximately 1.85 acres.

EXISTING CONDITIONS

Currently the front half of the site is open and the rear half is wooded. The site is high in the middle and slopes to the front and rear of the lot.

ADJACENT AREAS

The site is bounded on the north by Richmond Rd., on the west by Chickahominy Rd., on the east by a vacant lot and on the south by Toano Middle School.

OFF-SITE AREA

The only off-site areas to be disturbed with the development of this site is the removal of the existing entrance from Chickahominy Road and the construction of a new VDOT commercial entrance on Chickahominy Road and Richmond Road. A CE-7 Permit will be required to be obtained from VDOT.

SOILS

Slagle fine sandy loam (29B)

This soil is deep, gently sloping, and moderately well drained.

Typically, the surface layer of this soil is dark grayish brown fine sandy loam about 4 inches thick. The subsurface layer is light yellowish brown fine sandy loam 5 inches thick. The subsoil extends to a depth of 50 inches. It is mostly mottled yellowish brown clay loam to a depth of 25 inches. Below this depth, the subsoil is mostly mottled clay loam and sandy clay loam. The substratum is mottled sandy clay loam to a depth of at least 60 inches.

In this Slagle sois, permeability is moderate in the upper part of the subsoil and moderately slow or slow in the lower part. The erosion hazard is moderate. The subsoil has moderate shrink-swell potential.

Suffolk fine sandy loam (31B)

This soil is deep, gently sloping, and well drained.

Typically, the surface layer of this soil is very dark grayish brown fine sandy loam about 4 inches thick. The subsurface layer is yellowish brown fine sandy loam 10 inches thick. The

subsoil is strong brown fine sandy loam and sandy clay loam 26 inches thick . The substratum is brown loamy fine sand to a depth of at least 64 inches.

The permeability of this Suffolk soil is moderate, and the erosion hazard is moderate. The subsoil has low shrink-swell potential.

See Report of Subsurface Investigation and Geotechnical Engineering Services in Appendix C.

CRITCAL EROSION AREAS

The critical erosion area associated with this site is the adjacent school site behind the site. To prevent sediment from leaving the site to this area, it is imperative that the contractor install all erosion and sediment control measures shown on these plans before any land disturbing activities commence. Regular inspection and maintenance is also required for all erosion and sediment control measures to keep them functioning as designed.

EROSION AND SEDIMENT CONTROL MEASURES

Unless otherwise indicated, all structural and vegetative erosion and sediment control practices shall be constructed and maintained according to minimum standards and specifications of the latest edition of Virginia Erosion and Sediment Control Handbook (VESCH). The minimum standards shall be adhered to unless otherwise waived or approved by variance.

STRUCTURAL PRACTICES

Temporary Stone Construction Entrance – 3.02

A construction entrance shall be provided at all points of ingress and egress to reduce the amount of mud transported onto paved public roads by motor vehicles and runoff.

Silt Fence – 3.05

Silt fence shall be placed around the limits of clearing to intercept and detain small amounts of sediment from disturbed areas during construction operations.

Storm Drain Inlet Protection - 3.07

Storm drain protection is installed at all drainage inlets to prevent sediment from entering the storm drainage systems prior to permanent stabilization for the disturbed areas.

Culvert Inlet Protection – 3.08

Culvert inlet protection shall be installed at the inlet to storm sewer culverts as depicted on the plans.

Temporary Diversion Dike – 3.09

Temporary diversion dikes are to be installed along the perimeter of the disturbed area to divert sediment-laden runoff to the sediment trap.

Temporary Sediment Trap – 3.13

A temporary sediment trap will be installed to detain sediment-laden runoff from the disturbed site long enough to allow the majority of the sediment to settle out.

Outlet Protection – 3.18

Outlet protection shall be provided to prevent scour at the concrete swale outlet and to minimize the potential for downstream erosion.

Rock Check Dam - 3.20

A rock check dam shall be placed at the outlet of the parking lot concrete swale to trap sediment and reduce the velocity of the concentrated stormwater flow, thereby reducing erosion of the downstream swale.

Soil Stabilization Blankets and Matting – 3.36

Jute mesh shall be provided to aid in controlling erosion on the infiltration basin and forebay sideslopes by providing a microclimate which protects young vegetation and promotes its establishment.

Tree Preservation and Protection – 3.38

Tree preservation and protection shall be provided to protect desirable trees from mechanical and other injury during land disturbing and construction activity.

Dust Control – 3.39

Dust control will be applied as depicted on the plans to prevent surface and air movement of dust from exposed soil surfaces and reduce the presence of airborne substances which may present health hazards, traffic safety problems or harm animal or plant life.

VEGETATIVE PRACTICES

Permanent Seeding – 3.32

All denuded areas, which will be left dormant for extended periods of time, shall be seeded with permanent vegetation immediately following grading. Selection of the seed mixture will depend on the time of year it is applied.

MANAGEMENT STRATEGIES

- Sediment trapping measures will be installed as the first step in grading and will be seeded and mulched immediately following installation.
- Temporary seeding or other stabilization will follow immediate after grading.
- The contractor shall be responsible for the installation and maintenance of all erosion and sediment control practices depicted on the Plans.
- After achieving adequate stabilization, the temporary controls will be cleaned and removed. Any areas disturbed in the removal process shall be graded, top soiled, and seeded accordingly.

PERMANENT STABILIZATION

All areas disturbed by construction shall be stabilized with permanent seeding immediately following finish grading. Seeding shall be accomplished with Kentucky 31 Tall Fescue according to Standards and Specifications 3.32, Permanent Seeding of the VESCH. Soil stabilization blankets will be installed over slopes, which have been brought to final grade and have been seeded to protect the slopes from rill and gully erosion and to allow seed to germinate properly. Mulch (straw or fiber) will be used on relatively flat areas. In all seeding operations, seed, fertilizer and lime will be applied prior to mulching.

STORMWATER MANAGEMENT

This project is for the construction of two office/retail buildings totaling 10,000 sf. The current site is partially wooded and contains 1.75 acres. After development the site will contain approximately 0.70 impervious acres. To meet the stormwater quality requirements of the James City County BMP Point System and the stormwater quantity requirements of Minimum Standard 19 of the Virginia Stormwater Management Handbook an infiltration basin (Type C-4 BMP) and infiltration trench (Type C-2 BMP) will be utilized to treat the additional stormwater runoff. The infiltration basin will treat the first one-inch of runoff, and the post-development runoff from the 1-year and 2-year storms. The outlet structure releases the 10-year post-development storm at 1.06 cfs, which is less than the pre-development rate of 1.08 cfs. The 2-year storm drains in approximately 40 hours and the 100-year post-development storm passes with 1.21 feet of freeboard. The infiltration trench treats the first one-inch of runoff from the rear of Building #2. BMP design calculations are provided in Appendix A. The infiltration basin outlet structure does not utilize a backup underdrain due to the fact that the depth of the pervious soil utilized for the infiltration basin floor is lower than the existing gravity stormwater outfall.

CALCULATIONS

Appendix B contains design calculations for the onsite sediment trap.

MAINTENANCE

In general, all erosion and sediment control measures will be checked daily and after each significant rainfall. The following items will be checked in particular:

Temporary Stone Construction Entrance – 3.02

The entrance shall be maintained in a condition, which will prevent tracking or flow of mud onto public rights-of-way. This may require periodic dressing with additional stone or the washing and reworking of existing stone as conditions demand. All materials spilled, dropped, washed, or tracked from vehicles onto roadways or into storm drains must be removed immediately. The use of water trucks to remove materials dropped, washed, or tracked onto roadways will not be permitted under any circumstances.

Silt Fence – 3.05

Silt Fences shall be inspected immediately after each rainfall and at least daily during prolonged rainfall. Any required repairs shall be made immediately.

Close attention shall be paid to the repair of damaged silt fence resulting from end runs and undercutting.

Should the fabric on a silt fence decompose or become ineffective prior to the end of the expected usable life and the barrier still be necessary, the fabric shall be replaced promptly.

Sediment deposits should be removed after each storm event. They must be removed when deposits reach approximately one-half the height of the barrier.

Any sediment deposits remaining in place after the silt fence is not longer required shall be dressed to conform with the existing grade, prepared and seeded.

Storm Drain Inlet Protection – 3.07

The structure shall be inspected after each rain and repairs made as needed.

Sediment shall be removed and the trap restored to its original dimensions when the sediment has accumulated to one-half the design depth of the trap. Removed sediment shall be deposited in a suitable area and in such a manner that it will not erode.

Structures shall be removed and the area stabilized when the remaining drainage area has been properly stabilized.

Culvert Inlet Protection – 3.08

The structure shall be inspected after each rain and repairs made as needed.

Aggregate shall be replaced or cleaned when inspection reveals that clogged voids are causing ponding, which interfere with on-site construction.

Sediment shall be removed and the impoundment restored to its original dimensions when sediment has accumulated to one-half the design depth. Removed sediment shall be deposited in a suitable area and in such a manner that it will not erode and cause sedimentation problems.

Temporary structures shall be removed when they have served their useful purpose but not before the upslope area has been permanently stabilized.

Temporary Diversion Dike - 3.09

The measure shall be inspected after every storm and repairs made to the dike, flow channel, outlet or sediment trapping facility, as necessary. Once every two weeks, whether a storm event has occurred or not, the measure shall be inspected and repairs made if needed. Damages caused by construction traffic or other activity must be repaired before the end of each working day.

Temporary Sediment Trap – 3.13

Sediment shall be removed and the trap restored to its original dimensions when the sediment has accumulated to one half the design volume of the wet storage. Sediment removal from the basin shall be deposited in a suitable area and in a manner that it will not erode and cause sedimentation problems.

Filter stone shall be regularly checked to ensure that filtration performance is maintained. Stone choked with sediment shall be removed and cleaned or replaced.

The structure should be checked regularly to ensure that it is structurally sound and has not been damaged by erosion or construction equipment. The height of the stone outlet should be checked to ensure that its center is at least 1 foot below the top of the embankment.

Rock Check Dam - 3.20

Check dams shall be checked for sediment accumulation after each runoff-producing storm event. Sediment shall be removed when it reaches one half of the original height of the measure.

Regular inspections shall be made to insure that the center of the dam is lower than the edges. Erosion caused by high flows around the edges of the dam shall be corrected immediately.

Permanent Seeding – 3.32

The seeded/mulched areas should be checked regularly to ensure that a good stand is established and maintained. Areas should be fertilized, mulched and re-seeded as needed. When it is clear that plants have not germinated on an area or have died, these areas must be re-seeded immediately to prevent erosion damage. However, it is extremely important to determine for what reason germination did not take place and make any corrective action necessary prior to reseeding the area.

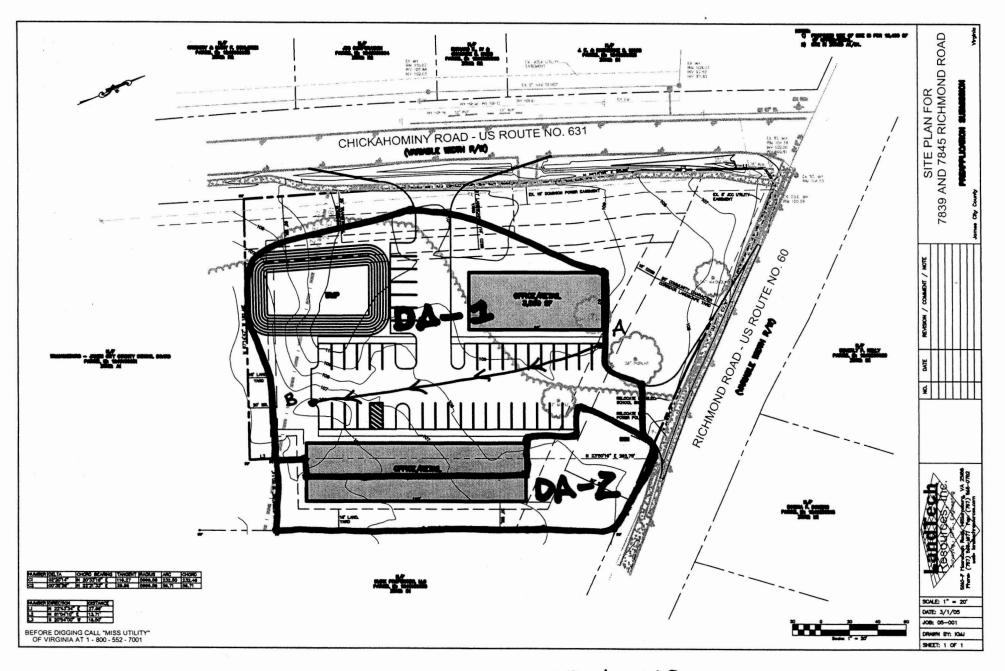
• Fertilizer shall be applied using approved fertilization methods and equipment.

- Formulations and application rates shall conform to the guidelines given in VESCH.
- Maintain a ground cover or organic mulch around trees that is adequate to prevent erosion, protect roots, and hold water.

Soil Stabilization Blankets and Matting – 3.36

All soil stabilization blankets and matting should be inspected periodically following installation, particularly after rainstorms to check for erosion and undermining. Any dislocation or failure should be repaired immediately. If washouts or breakage occurs, reinstall the material after repairing damage to the slope. Continue to monitor these areas until which time they become permanently stabilized; at that time an annual inspection should be adequate.

APPENDIX A



POST- DEVELOPMENT DRAINAGE AREA MAP

Design BMP #1

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Check one: \Box Present \blacksquare Developed $\Box A - 1$ 1. Runoff Curve number Soil name and hydrologic group (cover type, treatment, and hydrologic condition; percent mperiods; unconnected/connected/meriods area ratio) 3. $\frac{3}{9}$						¢	Date		
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and hydrologic group (apendix A) (cover type, treatment, and hydrologic condition; percent imperious; unconnected/connected/inpervious area ratio) Sufficil K (B) Sufficil	1. Runoff curve nu	ımber							
$\begin{array}{c c} y \operatorname{corp} \\ group \\ (appendix A) \\ \hline \\ (eppendix A) \\ \hline \\ group \\ (appendix A) \\ \hline \\ (eppendix A) \\ \hline \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ $	and	Cover description			CN ¹	v 	Area	of	
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(210-VI-TR-55, Second Ed., June 1986)

Worksheet 3: Time of Concentratio	on (T _c) or travel tim	e (T _t)
7845 Richmond Rd.	By KMJ	Date 3/1105
Location James City County	Checked	Date
Check one: Present X Developed		
Check one: $\square T_t$ through subarea		
Notes: Space for as many as two segments per flow typ Include a map, schematic, or description of flow		
Sheet flow (Applicable to Tc only)		
Segment ID 1. Surface description (table 3-1) 2. Manning's roughness coefficient, n (table 3-1) 3. Flow length, L (total L † 300 ft) 4. Two-year 24-hour rainfall, P2 5. Land slope, s 6. $T_t = \frac{0.007 (nL)^{0.8}}{P_2^{0.5} s^{0.4}}$	AB Pauco -011 215 3,5 -01 +	=.05
Shallow concentrated flow		
Segment ID7. Surface description (paved or unpaved)8. Flow length, L9. Watercourse slope, s10. Average velocity, V (figure 3-1)11. $T_t = \frac{L}{3600 \text{ V}}$		
Channel flow		
Segment ID 12. Cross sectional flow area, a ft ² 13. Wetted perimeter, p_W ft 14. Hydraulic radius, $r = \frac{a}{p_W}$ Compute r 15 Channel slope, s p_W		

	Richm	×		Location James Frequency (yr)	City	County	, Va.	By KM	2	Date 3/\ Date	3/105		
STOR N	Drainage area	Time of concen- tration	Travel time through subarea	Downstream subarea names	Travel time summation to outlet	24-hr rain- fall	Runoff curve number	Runoff		Initial abstraction			
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		From work	ksheet 3				From wo	rksheet 2		From table 5-1			

Worksheet 5a: Basic watershed data

(210-VI-TR-55, Second Ed., June 1986)

D-5

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<u>1</u>/ Worksheet 5a. Rounded as needed for use with exhibit 5.
 <u>2</u>/ Enter rainfall distribution type used.
 <u>3</u>/ Hydrograph discharge for selected times is A_mQ multiplied by tabular discharge from appropriate exhibit 5.

D-6

(210-VI-TR-55, Second Ed., June 1986)

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Surveying • Engineering • GPS

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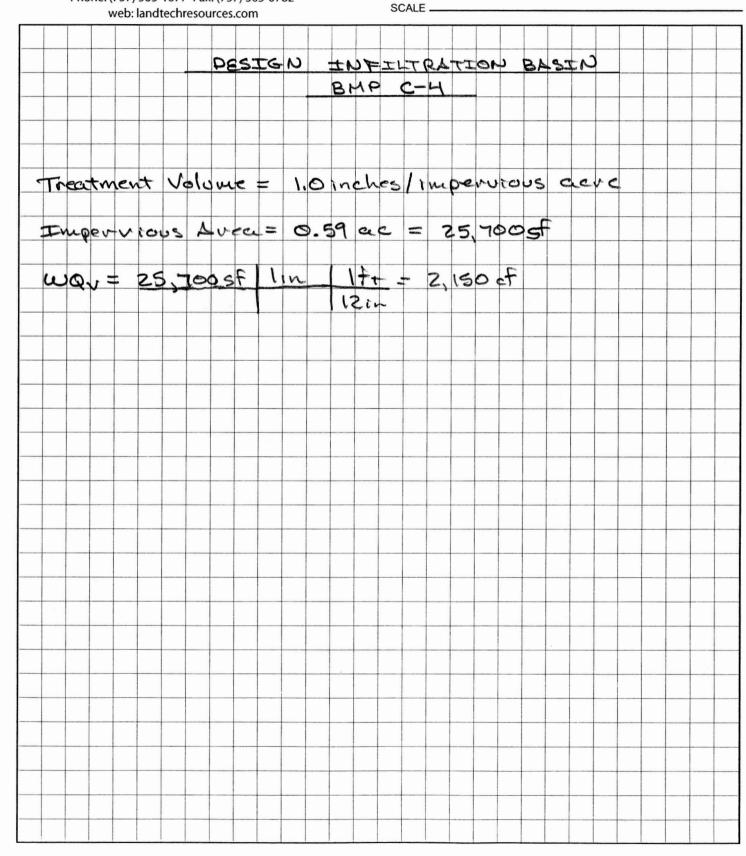
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PROJECT NO. 05-001

SHEET NO.______ OF_____

CALCULATED BY KMS DATE 312105

SCALE -



1-Year Hydrograph

1****** ************** SCSHYDRO ******** ********************** COMPUTER-AIDED HYDROLOGY & HYDRAULICS ******** PROJECT: 7845 RICHMOND RD User: LandTech Resources Date: 06/07/2005 Tuesday Time: 09:23:34 Input: RR1.IN Output: RR1.OUT NUMBER OF STORMS TO BE MODELED : 1 NUMBER OF CHANNELS 0 : NUMBER OF SUBAREAS 1 : 0 LOCATIONS UPSTREAM HYDROGRAPHS ENTER AT : NUMBER OF TIME STEPS 500 : COMPUTATIONAL TIME INCREMENT : .040 Hours NOTE: The DURATION of the final computed hydrograph(s) for this watershed system will be 20.000 hours. UNIT HYDROGRAPH METHODOLOGY ------The SCS DIMENSIONLESS UNIT HYDROGRAPH is used in all runoff computations. The peak rate factor (PRF) for all unit hydrographs is 484 (U.S. Customary units) or 2.08356 (Metric units). 1****** SCSHYDRO ********************** PROJECT: 7845 RICHMOND RD User: LandTech Resources Date: 06/07/2005 Tuesday Time: 09:23:34 Input: RR1.IN Output: RR1.OUT SUBAREA DATA TIME OF SUBAREA BASEFLOW AREA CONCENTRATION CURVE ID NO (mi2) (hrs) NUMBER (cfs) DOWNSTREAM CHANNELS 1 .0015 .050 84.00 .0 Composite Watershed Curve Number = 84.00 Minimum Subarea Time of Concentration = .050 hours. **** 1********* SCSHYDRO

******* *********************** COMPUTER-AIDED HYDROLOGY & HYDRAULICS ******* PROJECT: 7845 RICHMOND RD User: LandTech Resources Date: 06/07/2005 Tuesday Time: 09:23:34 Input: RR1.IN Output: RR1.OUT RETURN PERIOD (yrs): 1 _____ RAINFALL HYETOGRAPH: SCS TYPE II RAINFALL DURATION: 24.00 Hours RAINFALL DEPTH: 2.80 Inches RAINFALL HYETOGRAPH, SCS TYPE II Time (Hours), Total Depth (Inches): .00 .06 .000, 2.000, 4.000, .13 6.000, .22 .34 7.000, .27 8.000, 8.500, .37 9.000, .41 .48 9.500, .46 9.750, 10.000, .51 10.500, .57 11.750, 1.00 11.000, .66 11.500, .79 12.000, 1.86 12.500, 2.06 13.000, 2.16 13.500, 2.24 14.000, 2.30 16.000, 2.46 20.000, 2.67 24.000, 2.80 1********** SCSHYDRO ****************************** ***** ****************** COMPUTER-AIDED HYDROLOGY & HYDRAULICS ************************ PROJECT: 7845 RICHMOND RD Input: RR1.IN Output: RR1.OUT RETURN PERIOD (yrs): 1 SUBAREA 1 SUBAREA 1 SUBAREA 1 SUBAREA 1 .0015 AREA (square miles) : TIME OF CONCENTRATION (hrs): .05 RUNOFF CURVE NUMBER : 84.00 BASEFLOW (cfs) : .00 DOWNSTREAM CHANNELS SUBAREA RUNOFF (cfs) TIME: +.00 +.04 +.08 +.12 +.16 +.20 +.24 +.28 +.32 +.36 (hrs) hrs .00 | .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .40 | .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .80 | .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 1.20 | .00 .00 .00 .00 .00 .00 .00 1.60 | .00 .00 .00 .00 .00 .00 .00 .00 .00 2.00 | .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 2.40 | .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 2.80 | .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 3.20 | .00 .00 .00 .00 .00 .00 .00 .00 3.60 | .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 4.00 | .00

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8.40	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
8.80		.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
9.20	1	.00	.00	.00	.00	.01	.01	.01	.01	.01	.01
9.60	1	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
10.00	1	.01	.01	.02	.02	.02	.02	.02	.02	.02	.02
10.40	1	.02	.02	.02	.02	.03	.03	.03	.03	.03	.03
10.80	1	.04	.04	.04	.04	.04	.04	.05	.06	.07	.07
11.20	1	.07	.07	.07	.08	.08	.08	.08	.08	.13	.22
11.60	1	.27	.30	.31	.33	.49	1.12	1.56	1.79	1.95	2.08
12.00	1	2.19	1.14	.50	.33	.29	.28	.28	.28	.28	.28
12.40	1	.28	.28	.28	.25	.18	.16	.15	.15	.15	.15
12.80	1	.15	.15	.15	.15	.15	.15	.13	.11	.11	.11
13.20		.11	.11	.11	.11	.11	.11	.11	.11	.10	.09
13.60	1	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09
14.00		.09	.09	.09	.09	.09	.09	.08	.08	.08	.08
14.40	1	.08	.08	.08	.07	.07	.07	.07	.07	.07	.07
14.80	1	.07	.06	.06	.06	.06	.06	.06	.06	.06	.06
15.20	1	.06	.06	.05	.05	.05	.05	.05	.05	.05	.05
15.60	1.1	.05	.05	.05	.05	.05	.05	.05	.05	.05	.05
16.00	1.1	.05	.05	.05	.05	.05	.05	.05	.05	.04	.04
16.40		.04	.04	.04	.04	.04	.04	.04	.04	.04	.04
16.80	1	.04	.04	.04	.04	.04	.04	.04	.04	.04	.04
17.20		.04	.04	.04	.04	.04	.04	.04	.04	.04	.04
17.60		.04	.04	.04	.04	.04	.04	.04	.04	.04	.04
18.00		.04	.04	.04	.04	.04	.04	.04	.04	.04	.04
18.40		.04	.04	.04	.04	.04	.04	.04	.04	.04	.04
18.80		.04	.04	.04	.04	.04	.04	.04	.03	.03	.03
19.20	I	.03	.03	.03	.03	.03	.03	.03	.03	.03	.03
19.60		.03	.03	.03	.03	.03	.03	.03	.03	.03	.03
			PEAK	RUNOFF	(cfs):		2.19				

PROJECT: 7845 RICHMOND RD User: LandTech Resources Date: 06/07/2005 Tuesday Time: 09:23:34 Input: RR1.IN Output: RR1.OUT

RETURN PERIOD (yrs): 1

DOWNSTREAM HYDROGRAPH

TIME:		+.00	+.04	+.08	+.12	+.16	+.20	+.24	+.28	+.32	+.36
(hrs)		hrs									
	I										
.00	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.40	I.	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.80	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
1.20	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
1.60	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
2.00	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
2.40	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
2.80	L	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
3.20	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
3.60	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00

DISCHARGE (cfs)

4.00	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
4.40		.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
4.80		.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
5.20	i	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
5.60	1. 1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
6.00	1.	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
6.40	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
6.80	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
7.20	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
7.60	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
8.00	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
8.40	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
8.80	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
9.20	1	.00	.00	.00	.00	.01	.01	.01	.01	.01	.01
9.60	1	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
10.00	i	.01	.01	.02	.02	.02	.02	.02	.02	.02	.02
10.40		.02	.02	.02	.02	.03	.03	.03	.03	.03	.03
10.80	Ì	.04	.04	.04	.04	.04	.04	.05	.06	.07	.07
11.20	i	.07	.07	.07	.08	.08	.08	.08	.08	.13	.22
11.60	i	.27	.30	.31	.33	.49	1.12	1.56	1.79	1.95	2.08
12.00	1	2.19	1.14	.50	.33	.29	.28	.28	.28	.28	.28
12.40	1	.28	.28	.28	.25	.18	.16	.15	.15	.15	.15
12.80	1	.15	.15	.15	.15	.15	.15	.13	.11	.11	.11
13.20	1	.11	.11	.11	.11	.11	.11	.11	.11	.10	.09
13.60	1	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09
14.00	1	.09	.09	.09	.09	.09	.09	.08		.08	.08
14.40	1	.08	.08	.08	.07	.07	.07	.07	.07	.07	.07
14.80	1	.07	.06	.06	.06	.06	.06	.06	.06	.06	.06
15.20	1	.06	.06	.05	.05	.05	.05	.05	.05	.05	.05
15.60	1	.05	.05	.05	.05	.05	.05	.05	.05	.05	.05
16.00	1	.05	.05	.05	.05	.05	.05	.05	.05	.04	.04
16.40	1	.04	.04	.04	.04	.04	.04	.04	.04	.04	.04
16.80	1	.04	.04	.04	.04	.04	.04	.04	.04	.04	.04
17.20	1	.04	.04	.04	.04	.04	.04	.04	.04	.04	.04
17.60	1	.04	.04	.04	.04	.04	.04	.04	.04	.04	.04
18.00	1	.04	.04	.04	.04	.04	.04	.04	.04	.04	.04
18.40	1	.04	.04	.04	.04	.04	.04	.04	.04	.04	.04
18.80		.04	.04	.04	.04	.04	.04	.04	.03	.03	.03
19.20	1	.03	.03	.03	.03	.03	.03	.03	.03	.03	.03
19.60	1	.03	.03	.03	.03	.03	.03	.03	.03	.03	.03
			PEAK	DISCHAF	RGE (cfs):	2.19				
				-		1 .	10 00				

PEAK DISCHARGE (cfs): TIME TO PEAK (hrs):

Hydrograph Saved In: RR1.DAT

1*******	*****	SCSHYDRO	********	****************
*****	********* V	Version 3.21	*******	*******
*****	COMPUTER-AIDED	HYDROLOGY &	HYDRAULICS	*****

12.00

PROJECT: 7845 RICHMOND RD User: LandTech Resources Date: 06/07/2005 Tuesday Time: 09:23:34 Input: RR1.IN Output: RR1.OUT

RETURN PERIOD (yrs):

1

HYDROLOGIC SUMMARY -------------- Volumes, Losses, and Discharges

SCS TYPE II Hyetograph. SCS DIMENSIONLESS UNIT HYDROGRAPH was used. APPLIED RAINFALL DEPTH (inches): 2.80

	VOLUME OF RAINFALL APPLIED (ac-ft)	VOLUME OF RUNOFF (ac-ft)	RAINFALL LOSSES (percent)	PEAK DISCHARGE (cfs)	PEAK DISCHARGE (cfs/ac)
SUBAREA 1	.22400	.10087	54.97 	2.187	2.278
TOTAL WATERSHED	.22400	.10087	 	2.187	2.278
TOTAL VOLUME	OF DISCHARGE COMPOSI	RSHED AREA (SO LEAVING WATER: IE WATERSHED (REA TIME OF CO	SHED (ac-ft): CURVE NUMBER:	.0015 .1009 84.00 .050 h	ours.

NOTE: "VOLUME OF RUNOFF" includes surface runoff only; baseflows are not included in this summation. The "TOTAL VOLUME OF DISCHARGE LEAVING WATERSHED" includes all baseflows. 1

2-Year Hydrograph

1***** SCSHYDRO ***** Version 3.21 ****** ***** PROJECT: 7845 RICHMOND RD User: LandTech Resources Date: 06/07/2005 Tuesday Time: 09:24:22 Input: RR2.IN Output: RR2.OUT PROGRAM EXECUTION NUMBER OF STORMS TO BE MODELED : 1 NUMBER OF CHANNELS 0 : NUMBER OF SUBAREAS 1 : UPSTREAM HYDROGRAPHS ENTER AT 0 LOCATIONS : NUMBER OF TIME STEPS 500 : COMPUTATIONAL TIME INCREMENT : .040 Hours NOTE: The DURATION of the final computed hydrograph(s) for this watershed system will be 20.000 hours. UNIT HYDROGRAPH METHODOLOGY ------The SCS DIMENSIONLESS UNIT HYDROGRAPH is used in all runoff computations. The peak rate factor (PRF) for all unit hydrographs is 484 (U.S. Customary units) or 2.08356 (Metric units). ************************* 1********* SCSHYDRO ******** PROJECT: 7845 RICHMOND RD User: LandTech Resources Tuesday Date: 06/07/2005 Time: 09:24:22 Input: RR2.IN Output: RR2.OUT -------SUBAREA DATA TIME OF SUBAREA AREA CONCENTRATION CURVE BASEFLOW ID NO (mi2) (hrs) NUMBER (cfs) DOWNSTREAM CHANNELS 1 .0015 .050 84.00 .0 Composite Watershed Curve Number = 84.00 Minimum Subarea Time of Concentration = .050 hours. **** 1 * * * * * * * * ******* SCSHYDRO

PROJECT: 7845 RICHMOND RD User: LandTech Resources Date: 06/07/2005 Tuesday Time: 09:24:22 Input: RR2.IN Output: RR2.OUT RETURN PERIOD (yrs): 2 RAINFALL HYETOGRAPH: SCS TYPE II RAINFALL DURATION: 24.00 Hours RAINFALL DEPTH: 3.50 Inches RAINFALL HYETOGRAPH, SCS TYPE II Time (Hours), Total Depth (Inches): .00 4.000, .17 6.000, .28 .000, 2.000, .08 .42 8.000, .34 .51 8.500, .47 7.000, 9.000, 10.000, .63 10.500, .71 11.750, 1.25 12.000, 2.32 13.500, 2.80 24.000, 3.50 14.000, 2.87 ***************************** ******** Version 3.21 ********************* PROJECT: 7845 RICHMOND RD Input: RR2.IN Output: RR2.OUT RETURN PERIOD (yrs): 2 SUBAREA 1 1 SUBAREA 1 SUBAREA SUBAREA 1 AREA (square miles) : .0015 TIME OF CONCENTRATION (hrs): .05 RUNOFF CURVE NUMBER : 84.00 BASEFLOW (cfs) .00 : DOWNSTREAM CHANNELS : SUBAREA RUNOFF (cfs) TIME: +.00 +.04 +.08 +.12 +.16 +.20 +.24 +.28 +.32 +.36 (hrs) hrs .00 .00 | .00 .00 .00 .00 .00 .00 .00 .00 .00 .40 | .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .80 | .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 1.20 | .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 1.60 | .00 .00 .00 .00 2.00 | .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 2.40 | .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 2.80 | .00 .00 .00 .00 .00 .00 .00 .00 .00 3.20 | .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 3.60 | .00 .00 .00 .00 .00 .00 .00 .00 .00 4.00 | .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 4.40 | .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 4.80 | .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 5.20 | .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 5.60 1 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00

6.00	1		.00	.00	.00	.00		00	.00	.00	.00	.00	.00	
6.40	i		.00	.00	.00	.00		00	.00	.00	.00	.00	.00	
6.80	1		.00	.00	.00	.00		00	.00	.00	.00	.00	.00	
7.20	1		.00	.00	.00	.00		00	.00	.00	.00	.00	.00	
7.60	1		.00	.00	.00	.00		00	.00	.00	.00	.00	.00	
8.00	1		.00	.00	.00	.00		00	.00	.01	.01	.01	.01	
8.40	1		.01	.01	.01	.01		01	.01	.01	.01	.01	.01	
8.80	1		.01	.01	.01	.01		01	.01	.01	.01	.01	.02	
9.20	1		.02	.02	.02	.02		02	.02	.02	.02	.02	.02	
9.60	1		.02	.02	.02	.02		02	.02	.02	.03	.03	.03	
10.00	1		.03	.03	.03	.04		04	.04	.04	.04	.04	.04	
10.40	1		.04	.04	.04	.05		05	.06	.06	.06	.06	.06	
10.80	1		.07	.07	.07	.07		07	.07	.09	.11	.12	.12	
11.20			.12	.12	.13	.13		13	.13	.14	.14	.22	.36	
11.60			.44	.47	.49	.51		76	1.70	2.32	2.61	2.80	2.94	
12.00			3.06	1.59	.70	.46		40	.38	.38	.38	.38	.38	
12.40			.38	.38	.39	.34		25	.21	.20	.20	.20	.20	
12.80			.20	.20	.20	.20		20	.20	.17	.15	.15	.15	
13.20			.15	.15	.15	.15		15	.15	.15	.15	.14	.13	
13.60			.12	.12	.12	.12		12	.12	.12	.12	.12	.12	
14.00			.12	.12	.12	.12		12	.12	.11	.11	.11	.11	
14.40			.11	.10	.10	.10		10	.10	.10	.09	.09	.09	
14.80			.09	.09	.09	.08		80	.08	.08	.08	.08	.08	
15.20			.08	.07	.07	.07		07	.07	.07	.07	.07	.07	
15.60			.07		.07	.06		06	.06	.06	.06	.06	.06	
16.00			.06	.06	.06	.06		06	.06	.06	.06	.06	.06	
16.40			.06	.06	.06	.06		06	.06	.06	.06	.06	.06	
16.80			.06	.06	.06	.06		06	.06	.06	.06	.06	.06	
17.20			.06	.06	.06	.06		06	.06	.05	.05	.05	.05	
17.60			.05	.05	.05	.05		05	.05	.05	.05	.05	.05	
	!		.05	.05	.05	.05		05 05	.05	.05	.05	.05	.05	
	!		.05	.05	.05	.05		05	.05	.05	.05	.05	.05	
18.80 19.20			.05	.05	.05	.05		05	.05	.03	.03	.03	.03	
				.05	.05	.05		04	.03	.04	.04	.04	.04	
19.60	1		.04	.04	.04	.04	•	04	.04	.04	.04	.04	.04	
					RUNOFF				3.06					
					TO PEAK	(hrs)	:		12.00					
-				*******					***	******	*******	******	********	r
******				*******			sion						********	
*****	**	***	*****	COME	OTER-A	LDED F	IYDRO	LOG	Y & HYDR	AULICS	*****			C

PROJECT: 7845 RICHMOND RD User: LandTech Resources Date: 06/07/2005 Tuesday Time: 09:24:22 Input: RR2.IN Output: RR2.OUT

RETURN PERIOD (yrs): 2

DOWNSTREAM HYDROGRAPH

TIME: (hrs)		+.00 hrs	+.04 hrs	+.08 hrs	+.12 hrs	+.16 hrs	+.20 hrs	+.24 hrs	+.28 hrs	+.32 hrs	+.36 hrs
	1										
.00	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.40	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.80	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
1.20	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
1.60	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
2.00	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
2.40	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
2.80	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
3.20	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
3.60	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00

DISCHARGE (cfs)

00.00	.00 .00	.00	.00	.00	.00
00.00	.00 .00	.00	.00	.00	.00
00.00	.00 .00	.00	.00	.00	.00
00.00	.00 .00	.00	.00	.00	.00
00.00	.00 .00	.00	.00	.00	.00
00.00	.00 .00	.00	.00	.00	.00
00.00	.00 .00	.00	.00	.00	.00
00.00	.00 .00	.00	.00	.00	.00
00.00	.00 .00	.00	.00	.00	.00
00.00	.00 .00	.00	.00	.00	.00
00.00	.00 .00	.01	.01	.01	.01
01 .01	.01 .01	.01	.01	.01	.01
01 .01	.01 .01	.01	.01	.01	.02
02 .02	.02 .02	.02	.02	.02	.02
02 .02	.02 .02	.02	.03	.03	.03
03 .04	.04 .04	.04	.04	.04	.04
04 .05	.05 .06	.06	.06	.06	.06
07 .07	.07 .07	.09	.11	.12	.12
13 .13	.13 .13	.14	.14	.22	.36
49 .51	.76 1.70	2.32	2.61	2.80	2.94
70 .46	.40 .38	.38	.38	.38	.38
39 .34	.25 .21	.20	.20	.20	.20
20 .20	.20 .20	.17	.15	.15	.15
15 .15	.15 .15	.15	.15	.14	.13
12 .12	.12 .12	.12	.12	.12	.12
12 .12	.12 .12	.11	.11	.11	.11
10 .10	.10 .10	.10	.09	.09	.09
.08	.08 .08	.08	.08	.08	.08
.07 .07	.07 .07	.07	.07	.07	.07
.06	.06 .06	.06	.06	.06	.06
06 .06	.06 .06	.06	.06	.06	.06
06 .06	.06 .06	.06	.06	.06	.06
06 .06	.06 .06	.06	.06	.06	.06
06 .06	.06 .06	.05	.05	.05	.05
05 .05	.05 .05	.05	.05	.05	.05
05 .05	.05 .05	.05	.05	.05	.05
05 .05	.05 .05	.05	.05	.05	.05
05 .05	.05 .05	.05	.05	.05	.05
05 .05	.05 .05	.04	.04	.04	.04
.04	.04 .04	.04	.04	.04	.04

PEAK DISCHARGE (cfs): TIME TO PEAK (hrs): Hydrograph Saved In: RR2.DAT

1******			SCSHYDRO		*****	
******	******	******	Version 3.21	*******	******	*****
********	****	COMPUTER-AI	DED HYDROLOGY &	HYDRAULICS	********	*******
PROJECT: 7845	RICHMON	ID RD				
User: Land	Tech Res	ources				
Date: 06/0	7/2005	Tuesday				
Time: 09:2	4:22					
Input: RR2.	IN					
Output: RR2.	OUT					

3.06

RETURN PERIOD (yrs):

2

HYDROLOGIC SUMMARY --------------- Volumes, Losses, and Discharges ------

SCS TYPE II Hyetograph. SCS DIMENSIONLESS UNIT HYDROGRAPH was used. APPLIED RAINFALL DEPTH (inches): 3.50

	VOLUME OI RAINFALI APPLIED (ac-ft)	and the second se	RAINFALL LOSSES (percent)	PEAK DISCHARGE (cfs)	PEAK DISCHARGE (cfs/ac)
SUBAREA	1 .28000	.14522	48.14	3.056	3.183
TOTAL WATERSHED	.28000	.14522	48.14	3.056	3.183

===

TOTAL WATERSHED AREA (square miles):	.0015
TOTAL VOLUME OF DISCHARGE LEAVING WATERSHED (ac-ft):	.1452
COMPOSITE WATERSHED CURVE NUMBER:	84.00
MINIMUM SUBAREA TIME OF CONCENTRATION:	.050 hours.

NOTE: "VOLUME OF RUNOFF" includes surface runoff only; baseflows are not included in this summation. The "TOTAL VOLUME OF DISCHARGE LEAVING WATERSHED" includes all baseflows. 1

10-Year Hydrograph

SCSHYDRO ****** ******* PROJECT: 7845 RICHMOND RD User: LandTech Resources Date: 06/07/2005 Tuesday Time: 09:25:03 Input: RR10.IN Output: RR10.OUT NUMBER OF STORMS TO BE MODELED : 1 NUMBER OF CHANNELS 0 : 1 NUMBER OF SUBAREAS : UPSTREAM HYDROGRAPHS ENTER AT 0 LOCATIONS : NUMBER OF TIME STEPS 500 : COMPUTATIONAL TIME INCREMENT : .040 Hours NOTE: The DURATION of the final computed hydrograph(s) for this watershed system will be 20.000 hours. UNIT HYDROGRAPH METHODOLOGY The SCS DIMENSIONLESS UNIT HYDROGRAPH is used in all runoff computations. The peak rate factor (PRF) for all unit hydrographs is 484 (U.S. Customary units) or 2.08356 (Metric units). 1******************************* SCSHYDRO ******* ********* Version 3.21 PROJECT: 7845 RICHMOND RD User: LandTech Resources Date: 06/07/2005 Tuesday Time: 09:25:03 Input: RR10.IN Output: RR10.OUT TIME OF SUBAREA AREA CONCENTRATION CURVE BASEFLOW ID NO (mi2) (hrs) NUMBER (cfs) DOWNSTREAM CHANNELS .0015 1 .050 84.00 .0 Composite Watershed Curve Number = 84.00 Minimum Subarea Time of Concentration = .050 hours. 1*********************** SCSHYDRO *****

PROJECT: 7845 RICHMOND RD User: LandTech Resources Date: 06/07/2005 Tuesday Time: 09:25:03 Input: RR10.IN Output: RR10.OUT RETURN PERIOD (yrs): 10 RAINFALL HYETOGRAPH: SCS TYPE II RAINFALL DURATION: 24.00 Hours RAINFALL DEPTH: 5.80 Inches RAINFALL HYETOGRAPH, SCS TYPE II Time (Hours), Total Depth (Inches): .00 4.000,.286.000,.468.500,.779.000,.8510.000,1.0510.500,1.18 .000, 2.000, .13 .57 8.000, .70 9.750, 1.00 7.000, .70 9.500, .95 10.500, 3.85 11.750, 2.07 13.500, 4.63 24.000, 5.80 14.000, 4.76 ***** ****** PROJECT: 7845 RICHMOND RD Input: RR10.IN Output: RR10.OUT RETURN PERIOD (yrs): 10 SUBAREA SUBAREA 1 SUBAREA SUBAREA 1 1 1 .0015 : AREA (square miles) TIME OF CONCENTRATION (hrs): .05 RUNOFF CURVE NUMBER : 84.00 BASEFLOW (cfs) : .00 DOWNSTREAM CHANNELS : SUBAREA RUNOFF (cfs) TIME: +.00 +.24 +.28 +.32 +.36 (hrs) hrs hrs hrs hrs hrs .00 | .00 00 .00 .00 .00 .00 .40 | .00 .00 .00 .00 .00 00

+.04 hrs	+.08 hrs	+.12 hrs	+.16 hrs	+.20 hrs
.00	.00	.00	.00	.0
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6.00	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
6.40	.01	.01	.01	.01	.01	.01	.01	.01	.01	.02
6.80	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02
7.20	.02	.02	.02	.02	.03	.03	.03	.03	.03	.03
7.60 1	.03	.03	.03	.03	.03	.03	.03	.03	.03	.03
8.00 1	.03	.04	.04	.04	.04	.04	.04	.04	.04	.04
8.40 1	.04	.04	.05	.05	.05	.05	.05	.05	.05	.05
8.80	.05	.05	.05	.06	.06	.06	.06	.06	.07	.07
9.20	.07	.07	.07	.07	.07	.07	.07	.07	.08	.08
9.60	.08	.08	.09	.09	.09	.09	.09	.09	.09	.09
10.00	.09	.11	.12	.12	.12	.12	.12	.13	.13	.13
10.40	.13	.13	.13	.14	.17	.18	.18	.18	.19	.19
10.80	.19	.19	.19	.19	.20	.20	.26	.30	.31	.32
11.20	. 32	.33	.33	.33	.33	.34	.34	.34	.55	.88
11.60	1.06	1.12	1.15	1.18	1.72	3.73	4.96	5.43	5.68	5.84
12.00	5.97	3.09	1.34	.88	.76	.73	.72	.72	.72	.73
12.40	.73	.73	.73	.63	.48	.40	.38	.38	.38	.38
12.80	.38	.38	.38	.38	.38	.38	.32	.29	.28	.28
13.20	.28	.28	.28	.28	.28	.28	.28	.28	.26	.23
13.60	.22	.22	.22	.22	.22	.22	.22	.22	.22	.22
14.00	.22	.22	.23	.22	.22	.22	.21	.21	.20	.20
14.40	.20	.19	.19	.19	.18	.18	.18	.17	.17	.17
14.80	.16	.16	.16	.16	.15	.15	.15	.15	.14	.14
15.20	.14	.14	.14	.13	.13	.13	.13	.13	.12	.12
15.60	.12	.12	.12	.12	.12	.12	.12	.12	.11	.11
16.00	.11	.11	.11	.11	.11	.11	.11	.11	.11	.11
16.40	.11	.11	.11	.11	.11	.11	.11	.11	.11	.11
16.80	.11	.11	.11	.10	.10	.10	.10	.10	.10	.10
17.20	.10	.10	.10	.10	.10	.10	.10	.10	.10	.10
17.60	.10	.10	.10	.10	.10	.10	.10	.10	.10	.10
18.00	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09
18.40	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09
18.80	.09	.09	.09	.09	.09	.09	.09	.08	.08	.08
19.20	.08	.08	.08	.08	.08	.08	.08	.08	.08	.08
19.60	.08	.08	.08	.08	.08	.08	.08	.08	.08	.08
			RUNOFF			5.97				
			TO PEAK			2.00				
1******	******				SHYDRO					******
******			******		sion 3.2	-	******			
******	*******	* CON	IPUTER-A	IDED HY	DROLOGY	& HYDI	RAULICS	****	******	******
	7845 RIC									
	LandTech									
	06/07/20	05 Tu	lesday							
	09:25:03									
	RR10.IN									
Output:	RR10.OUT									
							RETURN	PERIOD	(yrs):	10

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DISCHARGE (cfs)

DOWNSTREAM HYDROGRAPH

TIME: (hrs)		+.00 hrs	+.04 hrs	+.08 hrs	+.12 hrs	+.16 hrs	+.20 hrs	+.24 hrs	+.28 hrs	+.32 hrs	+.36 hrs
.00	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.40	i	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.80	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
1.20	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
1.60	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
2.00	L	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
2.40	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
2.80	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
3.20	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
3.60	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00

4.00	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
4.40	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
4.80	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
5.20	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
5.60	1	.00	.00	.00	.00	.01	.01	.01	.01	.01	.01
6.00	1	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
6.40	1	.01	.01	.01	.01	.01	.01	.01	.01	.01	.02
6.80	1	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02
7.20	1	.02	.02	.02	.02	.03	.03	.03	.03	.03	.03
7.60	1	.03	.03	.03	.03	.03	.03	.03	.03	.03	.03
8.00	1	.03	.04	.04	.04	.04	.04	.04	.04	.04	.04
8.40	1	.04	.04	.05	.05	.05	.05	.05	.05	.05	.05
8.80	1.	.05	.05	.05	.06	.06	.06	.06	.06	.07	.07
9.20	1	.07	.07	.07	.07	.07	.07	.07	.07	.08	.08
9.60	1	.08	.08	.09	.09	.09	.09	.09	.09	.09	.09
10.00	1	.09	.11	.12	.12	.12	.12	.12	.13	.13	.13
10.40		.13	.13	.13	.14	.17	.18	.18	.18	.19	.19
10.80		.19	.19	.19	.19	.20	.20	.26	.30	.31	.32
11.20		.32	.33	.33	.33	.33	.34	.34	.34	.55	.88
11.60		1.06	1.12	1.15	1.18	1.72	3.73	4.96	5.43	5.68	5.84
12.00		5.97	3.09	1.34	.88	.76	.73		.72	.72	.73
12.40		.73	.73	.73	.63	.48	.40	.38	.38		.38
12.80		.38	.38	.38	.38	.38	.38	.32	.29	.28	.28
13.20			.28	.28	.28	.28	.28		.28	.26	.23
13.60		.22	.22	.22	.22	.22	.22		.22	.22	.22
14.00		.22	.22	.23	.22	.22	.22	.21	.21	.20	.20
14.40		.20	.19	.19	.19	.18	.18		.17	.17	.17
14.80		.16	.16	.16	.16	.15	.15	.15	.15	.14	.14
15.20		.14	.14	.14	.13	.13	.13	.13	.13	.12	.12
15.60		.12	.12	.12	.12	.12	.12	.12	.12	.11	.11
16.00		.11	.11	.11	.11	.11	.11	.11	.11	.11	.11
16.40		.11	.11	.11	.11	.11	.11	.11	.11	.11	.11
16.80		.11	.11	.11	.10	.10	.10	.10	.10	.10	
17.20		.10	.10	.10	.10	.10	.10	.10	.10		.10
17.60		.10	.10	.10	.10	.10	.10	.10	.10	.10	.10
18.00		.09	.09	.09	.09	.09	.09	.09	.09	.09	.09
18.40		.09	.09	.09	.09	.09	.09	.09	.09	.09	.09
18.80		.09	.09	.09	.09	.09	.09	.09	.08	.08	.08
19.20		.08	.08	.08	.08	.08	.08	.08	.08	.08	.08
19.60		.08	.08	.08	.08	.08	.08	.08	.08	.08	.08
			PEAK	DISCHA	RGE (cf	s):	5.97				
Undragen	ant	Corred	TIN TD: BB1		EAK (hr	s):	12.00				

PEAK DISCHARGE (cfs): TIME TO PEAK (hrs): Hydrograph Saved In: RR10.DAT

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1*******	*******	*******	SCSHYDRO	********	*****	******
*******	*********	********	Version 3.21	********	********	******
*******	******	COMPUTER-AI	DED HYDROLOGY &	HYDRAULICS	*******	******
PROJECT:	7845 RICHMON	ND RD				
User:	LandTech Res	sources				
Date:	06/07/2005	Tuesday				
Time:	09:25:03					
Input:	RR10.IN					
Output:	RR10.OUT					
				RETURN	PERIOD (vrs):	10

SCS TYPE II Hyetograph. SCS DIMENSIONLESS UNIT HYDROGRAPH was used. APPLIED RAINFALL DEPTH (inches): 5.80

	VOLUME OF RAINFALL APPLIED (ac-ft)	VOLUME OF RUNOFF (ac-ft)	RAINFALL LOSSES (percent)	PEAK DISCHARGE (cfs)	PEAK DISCHARGE (cfs/ac)
SUBAREA	1 .46400	.30377	34.53 	5.969	6.218
TOTAL WATERSHED	.46400	.30377	34.53	5.969	6.218
	TOTAL WATE	POLIFD ADEA (e	quare miles).	0015	

TOTAL	WATERSHED AREA (square miles):	.0015
TOTAL VOLUME OF DISCH	ARGE LEAVING WATERSHED (ac-ft):	.3038
CO	POSITE WATERSHED CURVE NUMBER:	84.00
MINIMUM	SUBAREA TIME OF CONCENTRATION:	.050 hours.

NOTE: "VOLUME OF RUNOFF" includes surface runoff only; baseflows are not included in this summation. The "TOTAL VOLUME OF DISCHARGE LEAVING WATERSHED" includes all baseflows.

100-Year Hydrograph

SCSHYDRO ******** ******* ***************** COMPUTER-AIDED HYDROLOGY & HYDRAULICS ********* PROJECT: 7845 RICHMOND RD User: LandTech Resources Date: 06/07/2005 Tuesday Time: 09:25:48 Input: RR100.IN Output: RR100.OUT PROGRAM EXECUTION _____ : NUMBER OF STORMS TO BE MODELED 1 NUMBER OF CHANNELS 0 : NUMBER OF SUBAREAS 1 : UPSTREAM HYDROGRAPHS ENTER AT 0 LOCATIONS : NUMBER OF TIME STEPS 500 : COMPUTATIONAL TIME INCREMENT : .040 Hours NOTE: The DURATION of the final computed hydrograph(s) for this watershed system will be 20.000 hours. UNIT HYDROGRAPH METHODOLOGY The SCS DIMENSIONLESS UNIT HYDROGRAPH is used in all runoff computations. The peak rate factor (PRF) for all unit hydrographs is 484 (U.S. Customary units) or 2.08356 (Metric units). 1******** SCSHYDRO ***** ****** ***** Version 3.21 ***************** COMPUTER-AIDED HYDROLOGY & HYDRAULICS ************************ PROJECT: 7845 RICHMOND RD User: LandTech Resources Date: 06/07/2005 Tuesday Time: 09:25:48 Input: RR100.IN Output: RR100.OUT TIME OF SUBAREA AREA CONCENTRATION CURVE BASEFLOW (hrs) ID NO (mi2) NUMBER DOWNSTREAM CHANNELS (cfs) .0015 .050 1 84.00 .0 Composite Watershed Curve Number = 84.00 Minimum Subarea Time of Concentration = .050 hours. 1********** SCSHYDRO ****

PROJECT: 7845 RICHMOND RD User: LandTech Resources Date: 06/07/2005 Tuesday Time: 09:25:48 Input: RR100.IN Output: RR100.OUT RETURN PERIOD (yrs): 100 RAINFALL HYETOGRAPH INFORMATION RAINFALL HYETOGRAPH: SCS TYPE II RAINFALL DURATION: 24.00 Hours RAINFALL DEPTH: 8.00 Inches RAINFALL HYETOGRAPH, SCS TYPE II Time (Hours), Total Depth (Inches): .000, .002.000, .184.000, .386.000, .647.000, .788.000, .968.500, 1.069.000, 1.189.500, 1.309.750, 1.3810.000, 1.4510.500, 1.6311.000, 1.8811.500, 2.2611.750, 2.8612.000, 5.3012.500, 5.8813.000, 6.1813.500, 6.3914.000, 6.5616.000, 7.0420.000, 7.6224.000, 8.00 ********************** ********* ********** ************ PROJECT: 7845 RICHMOND RD Input: RR100.IN Output: RR100.OUT RETURN PERIOD (yrs): 100 SUBAREA SUBAREA 1 1 SUBAREA 1 SUBAREA 1 .0015 AREA (square miles) 10.00

TIME OF CONCENTRATION (hrs): .05 RUNOFF CURVE NUMBER : 84.00 BASEFLOW (cfs) : .00 DOWNSTREAM CHANNELS :

SUBAREA RUNOFF (cfs)

TIME:		+.00	+.04	+.08	+.12	+.16	+.20	+.24	+.28	+.32	+.36
(hrs)		hrs									
.00	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.40	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.80	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
1.20	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
1.60	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
2.00	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
2.40	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
2.80	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
3.20	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
3.60	I	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
4.00	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.01
4.40	1	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
4.80	1	.01	.01	.01	.01	.01	.02	.02	.02	.02	.02
5.20	1	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02
5.60	1	.02	.02	.02	.02	.02	.03	.03	.03	.03	.03

6.00	.03	.03	.03	.03	.03	.03	.03	.04	.04	.04
6.40	.04	.04	.04	.04	.04	.04	.04	.04	.04	.04
6.80	.04	.04	.04	.04	.04	.04	.05	.05	.06	.06
7.20		.06	.06	.06	.06	.06	.06	.06	.06	.06
7.60		.07	.07	.07	.07	.07	.07	.07	.07	.07
8.00		.08	.08	.09	.09	.09	.09	.09	.09	.09
8.40		.09	.09	.10	.10	.10	.10	.10	.10	.11
8.80		.11	.11	.11	.11	.11	.12	.13	.13	.13
9.20		.13	.13	.13	.13	.13	.14	.14	.14	.15
9.60		.16	.16	.16	.16	.16	.16	.16	.16	.16
10.00		.19	.21	.21	.22	.22	.22	.22	.22	.22
10.00		.23	.21	.21	.29	.22	.31	.32	.32	.32
		.23	.23	.23	.29	.33	. 44	.50	.52	.53
10.80					.55	.55	.55	.56	. 89	1.42
11.20		.54	.54	.54		5.74	7.55	8.17	8.45	8.63
11.60		1.78	1.82	1.85	2.68					
12.00		4.52	1.96	1.29	1.10	1.05	1.05	1.05	1.05	1.05
12.40		1.05	1.05	.91	.69	.58	.55	.55	.54	.54
12.80		.54	.54	.54	.54	.55	.46	.42	.40	.40
13.20		.40	.40	.40	.40	.40	.40	.40	.37	.34
13.60		.31	.31	.31	.31	.31	.31	.31	.31	.31
14.00	.31	.32	.32	.32	.31	.31	.30	.30	.29	.29
14.40	.28	.28	.27	.27	.26	.26	.25	.25	.24	.24
14.80	.23	.23	.23	.22	.22	.22	.21	.21	.21	.20
15.20	.20	.20	.19	.19	.19	.19	.18	.18	.18	.18
15.60	.17	.17	.17	.17	.17	.17	.17	.16	.16	.16
16.00		.16	.16	.16	.16	.16	.16	.16	.16	.16
16.40		.16	.16	.16	.15	.15	.15	.15	.15	.15
16.80		.15	.15	.15	.15	.15	.15	.15	.15	.15
17.20	•	.15	.14	.14	.14	.14	.14	.14	.14	.14
17.60	•	.14	.14	.14	.14	.14	.14	.14	.14	.14
18.00		.13	.13	.13	.13	.13	.13	.13	.13	.13
18.40		.13	.13	.13	.13	.13	.13	.13	.13	.13
18.80		.12	.12	.12	.12	.12	.12	.12	.12	.12
19.20		.12	.12	.12	.12	.12	.12	.12	.11	.11
19.60		.11	.11	.11	.11	.11	.11	.11	.11	.11
19.60	.11	.11	.11	.11	.11	.11	.11	.11		
		DEA	K RUNOFF	(cfc).		8.75				
						12.00				
1	* * * * * * * * * * *		TO PEAK				******	******	******	******
	*******				SHYDRO					*******
	*********				ion 3.3					*******
******	*******	** CO	MPUTER-A	IDED HY	DROLOG	Y & HYD	RAULICS	* * * *	******	
	r: 7845 RI									
	r: LandTeck									
	e: 06/07/2		uesday							
Time	e: 09:25:4	8								
Input	t: RR100.II	N								
Output	t: RR100.0	UT								
							RETURN	PERIOD	(yrs):	100
			==== D	OWNSTRE	AM HYD	ROGRAPH	====			

TIME: (hrs)	+.00 hrs	+.04 hrs	+.08 hrs	+.12 hrs	+.16 hrs	+.20 hrs	+.24 hrs	+.28 hrs	+.32 hrs	+.36 hrs
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.40	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.80	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
1.20	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
1.60	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
2.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
2.40	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
2.80	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
3.20	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
3.60	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
	(hrs) ,00 ,40 .80 1.20 1.60 2.00 2.40 2.80 3.20	(hrs) hrs .00 .00 .40 .00 .80 .00 1.20 .00 1.60 .00 2.40 .00 2.40 .00 2.80 .00 3.20 .00	(hrs) hrs hrs I I I .00 .00 .00 .40 .00 .00 .80 .00 .00 1.20 .00 .00 1.60 .00 .00 2.00 .00 .00 2.40 .00 .00 2.80 .00 .00 3.20 .00 .00	(hrs) hrs hrs hrs I I I I .00 .00 .00 .00 .40 .00 .00 .00 .80 .00 .00 .00 .80 .00 .00 .00 1.20 .00 .00 .00 1.60 .00 .00 .00 2.00 .00 .00 .00 2.40 .00 .00 .00 2.80 .00 .00 .00 3.20 .00 .00 .00	(hrs) hrs hrs hrs hrs hrs .00 .00 .00 .00 .00 .00 .40 .00 .00 .00 .00 .00 .80 .00 .00 .00 .00 .00 .80 .00 .00 .00 .00 .00 1.20 .00 .00 .00 .00 .00 1.60 .00 .00 .00 .00 .00 2.40 .00 .00 .00 .00 .00 .00 2.80 .00 .00 .00 .00 .00 .00 3.20 .00 .00 .00 .00 .00 .00	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$

DISCHARGE (cfs)

4.00	1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.01	
4.40	1	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	
4.80	i	.01	.01	.01	.01	.01	.02	.02	.02	.02	.02	
5.20		.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	
5.60		.02	.02	.02	.02	.02	.03	.03	.03	.03	.03	
	i	.03	.03	.03	.03	.03	.03	.03	.04	.04	.04	
	i	.04	.04	.04	.04	.04	.04	.04	.04	.04	.04	
	i	.04	.04	.04	.04	.04	.04	.05	.05	.06	.06	
7.20		.06	.06	.06	.06	.06	.06	.06	.06	.06	.06	
7.60		.06	.07	.07	.07	.07	.07	.07	.07	.07	.07	
8.00		.07	.08	.08	.09	.09	.09	.09	.09	.09	.09	
8.40		.09	.09	.09	.10	.10	.10	.10	.10	.10	.11	
8.80		.11	.11	.11	.11	.11	.11	.12	.13	.13	.13	
		.13	.13	.13	.13	.13	.13	.14	.14	.14	.15	
	1	.15	.15	.16	.16	.16	.16	.16	.16	.16	.16	
	i	.13	.10	.10	.21	.22	.22	.22	.22	.22	.22	
	1	.23	.23	.23	.21	.29	.31	.31	.32	.32	.32	
	•	.23	.23	.23	.23	.29	.33	.44	.50	.52	.53	
	1	. 52	.52	.53	.53	.55	.55	.55	.56	.89	1.42	
	1		1.78	1.82	1.85	2.68	5.74	7.55	8.17	8.45	8.63	
11.60	· · · ·	1.69			1.29		1.05	1.05	1.05	1.05	1.05	
12.00		8.75	4.52	1.96		1.10		.55	.55	.54	.54	
12.40		1.05	1.05	1.05	.91	.69	.58			. 34	. 40	
12.80		.54	.54	.54	.54	.54	.55	.46	.42			
	L	.40	.40	.40	.40	.40	.40	.40	.40	.37	.34	
	1	.32	.31	.31	.31	.31	.31	.31	.31	.31	.31	
	1	.31	.32	.32	.32	.31	.31	.30	.30	.29	.29	
		.28	.28	.27	.27	.26	. 20	. 20	.25	.24	.24	
14.80		.23	.23	.23	.22	.22	.22	.21	.21	.21	.20	
15.20	1	.20	.20	.19	.19	.19	.19	.18	.18	.18	.18	
15.60	1	.17	.17	.17	.17	.17	.17	.17	.16	.16	.16	
16.00	1	.16	.16	.16	.16	.16	.16	.16	.16	.16	.16	
16.40	1	.16	.16	.16	.16	.15	.15	.15	.15	.15	.15	
16.80	1	.15	.15	.15	.15	.15	.15	.15	.15	.15	.15	
17.20	1	.15	.15	.14	.14	.14	.14	.14	.14	.14	.14	
17.60	1	.14	.14	.14	.14	.14	.14	.14	.14	.14	.14	
18.00	1	.14	.13	.13	.13	.13	.13	.13	.13	.13	.13	
18.40	1	.13	.13	.13	.13	.13	.13	.13	.13	.13	.13	
18.80	1	.12	.12	.12	.12	.12	.12	.12	.12	.12	.12	
19.20	1	.12	.12	.12	.12	.12	.12	.12	.12	.11	.11	
19.60	1	.11	.11	.11	.11	.11	.11	.11	.11	.11	.11	
			DEAK	DISCHAR	RGE (cfs	. (2	8 75					
			TIN	E TO DI	EAK (hrs	5).	12 00					
Hudrog	ranh	Saund	In: RR1			57.	12.00					
nyurog	Laph	Javeu	111. KKI	DAI								
1*****	****	*****	******	*****	* 50	CSHYDRO	***	*****	******	******	******	*
			*******			sion 3.2			******			

PROJECT: 7845 RICHMOND RD User: LandTech Resources Date: 06/07/2005 Tuesday Time: 09:25:48 Input: RR100.IN Output: RR100.OUT

RETURN PERIOD (yrs): 100

HYDROLOGIC SUMMARY --------- Volumes, Losses, and Discharges -----

SCS TYPE II Hyetograph. SCS DIMENSIONLESS UNIT HYDROGRAPH was used. APPLIED RAINFALL DEPTH (inches): 8.00

	VOLUME OF RAINFALL APPLIED (ac-ft)	VOLUME OF RUNOFF (ac-ft)	RAINFALL LOSSES (percent)	PEAK DISCHARGE (cfs)	PEAK DISCHARGE (cfs/ac)
SUBAREA 1	.64000	.46388	27.52	8.748	9.112
TOTAL WATERSHED	.64000	.46388	1 27.52	8.748	9.112
TOTAL VOLUME	OF DISCHARGE COMPOSI	RSHED AREA (S LEAVING WATER TE WATERSHED REA TIME OF C	SHED (ac-ft): CURVE NUMBER:	.0015 .4639 84.00 .050 1	hours.

NOTE: "VOLUME OF RUNOFF" includes surface runoff only; baseflows are not included in this summation. The "TOTAL VOLUME OF DISCHARGE LEAVING WATERSHED" includes all baseflows.

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58		F Moo one: ()	757)	565-	1677	Fax	: (75)	7) 56	5-07		8				ALCU		ED B'	Y		19.	2		_DA	TE	31	20	<u>.</u>
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LandTech Resources, Inc.

Surveying • Engineering • GPS

5810-F Mooretown Road, Williamsburg, VA 23188 Phone: (757) 565-1677 Fax: (757) 565-0782 web: landtechresources.com

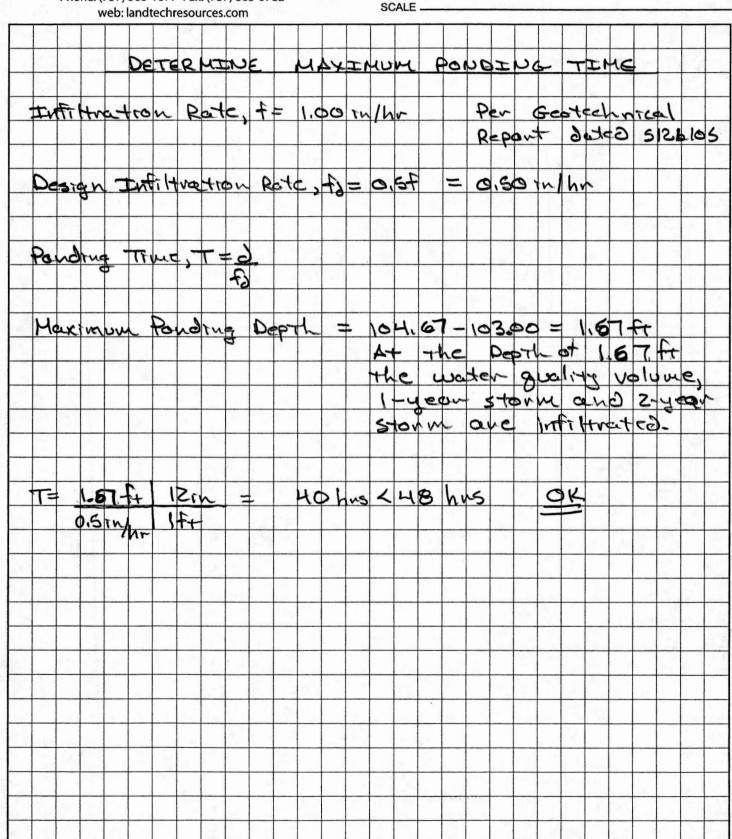
PROJECT NAME

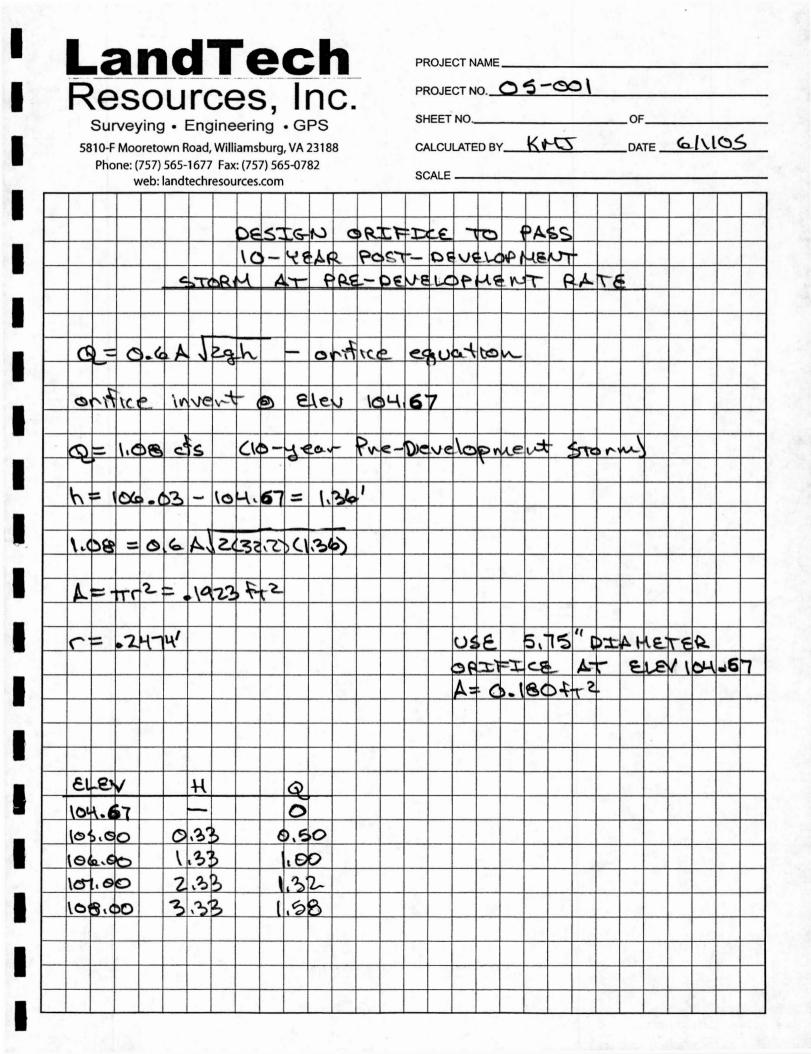
PROJECT NO. 05-001

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OF





LandTech PROJECT NAME PROJECT NO. 05-001 Resources, Inc. SHEET NO._____ OF Surveying • Engineering • GPS CALCULATED BY KMJ DATE 6/1105 5810-F Mooretown Road, Williamsburg, VA 23188 Phone: (757) 565-1677 Fax: (757) 565-0782 SCALE web: landtechresources.com DESIGN OUTLET WEIR Q= CLH3/2 C= 3.1 L= 3.0×4 = 12' (VOOT DI-7) RIM 106.40 ELEV H 0 O 106.40 107.00 17.29 0.60 108.00 .60 75.29

LandTech Resources, Inc.

Surveying • Engineering • GPS

5810-F Mooretown Road, Williamsburg, VA 23188 Phone: (757) 565-1677 Fax: (757) 565-0782 web: landtechresources.com

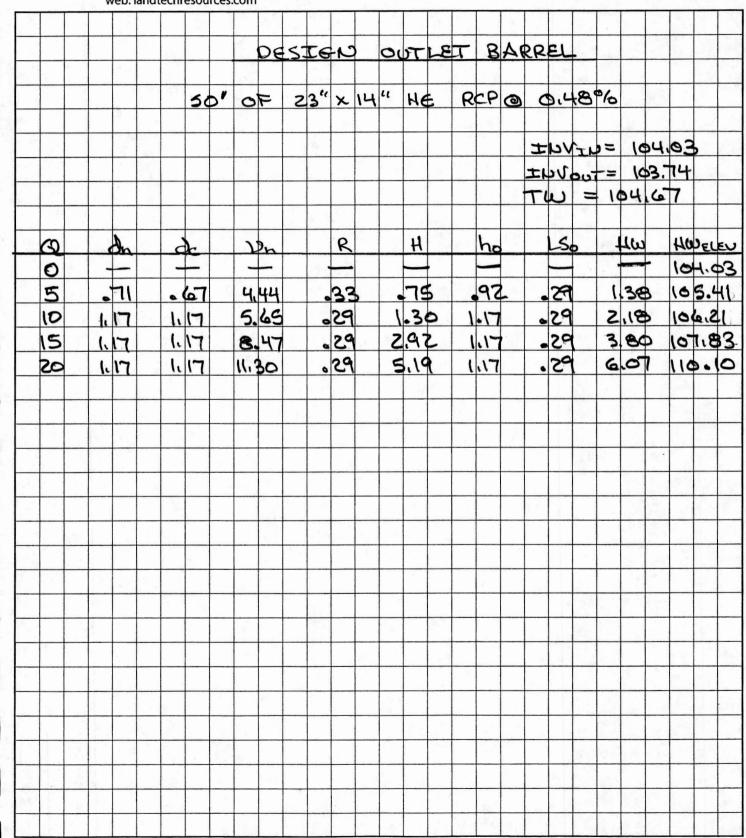
PROJECT NAME PROJECT NO. 05-001

SHEET NO._____

OF____

CALCULATED BY KMJ DATE GILLOS

SCALE -



LandTech Resources, Inc.

Surveying • Engineering • GPS

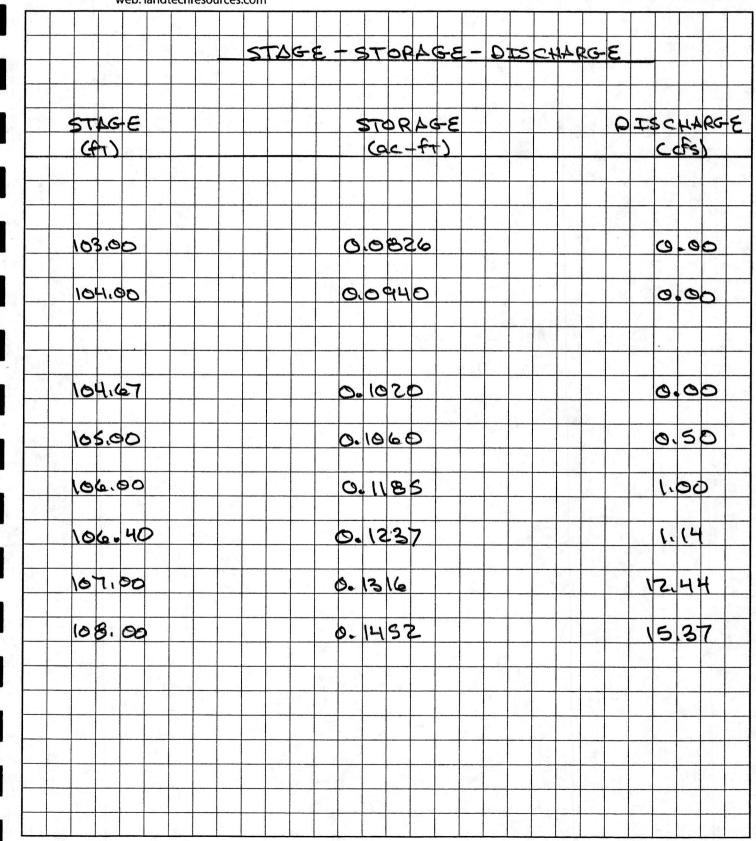
5810-F Mooretown Road, Williamsburg, VA 23188 Phone: (757) 565-1677 Fax: (757) 565-0782 web: landtechresources.com

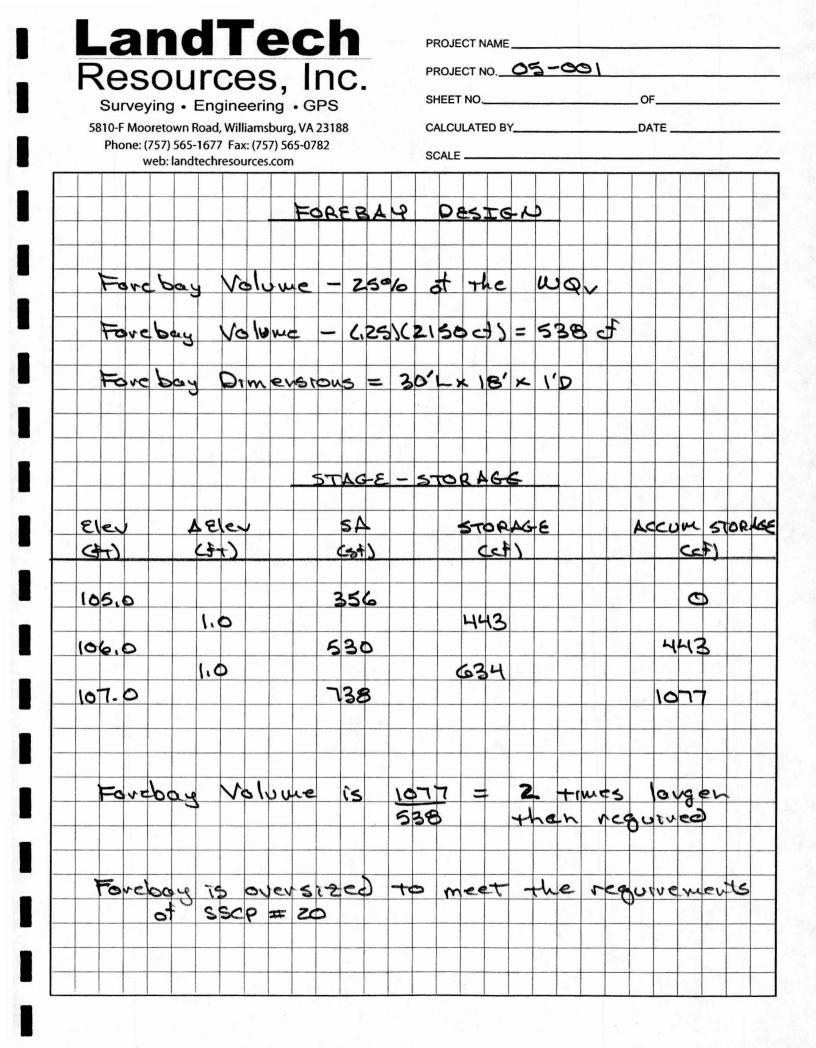
PROJECT NAME PROJECT NO. 05-001

SHEET NO._____ OF_____

CALCULATED BY KMJ DATE GIVIOS

SCALE ____





10 -Year Routing

1********************************* PONDOPT ************************* ***** Version 1.83 ****** ***** COMPUTER-AIDED HYDROLOGY & HYDRAULICS ***** PROJECT: 7845 RICHMOND RD User: LandTech Resources Date: 07/21/2005 Thursday Time: 13:30:41 Output: RRP10.OUT SOLUTION FOR 1 STORMS. TIME INCREMENT: .040 Hours STORM NUMBER HYDROGRAPH IN FILE: 1 RR10.DAT ALLOWABLE RUNOFF TAILWATER PEAK PEAK STORM DISCHARGE DURATION VOLUME STAGE INFLOW NUMBER (cfs) (cfs) (min) (ft3) (ft) 1 5.969 N/A 1197.60 .1323E+05 104.670 ***** 1**** ****** PONDOPT ****** Version 1.83 ******************** COMPUTER-AIDED HYDROLOGY & HYDRAULICS ****** ******* PROJECT: 7845 RICHMOND RD User: LandTech Resources Date: 07/21/2005 Thursday Time: 13:30:41 Output: RRP10.OUT Stage-Area-Discharge Filename: RRPOND.DAT TAILWATER STAGE: 104.670 feet. INITIAL STAGE: 104.670 feet. <<<<<<< > STORM 1 STORAGE STAGE VOLUME DISCHARGE (ft) (ac-ft) (cfs) 103.000 .0000 .0000 104.000 .8824E-01 .0000 104.670 .1539 .0000 105.000 .1882 .5000 106.000 .3004 1.000 106.400 .3488 1.140 107.000 .4254 12.44 108.000 15.37 .5638 ************ PONDOPT ******* ******* 1*******

PROJECT: 7845 RICHMOND RD User: LandTech Resources Date: 07/21/2005 Thursday Time: 13:30:41 Output: RRP10.OUT

TAILWATER STAGE: 104.670 feet. INITIAL STAGE: 104.670 feet.

MAXIMUM ELEVATION:	105.9	feet.
MAXIMUM INFLOW:	5.969	cfs.
MAXIMUM OUTFLOW:	.9363	cfs.
MAXIMUM STORAGE:	.2861	acre-feet.

CONTINUITY ERROR: .207E-05 percent.

TIME (min)	INFLOW RATE (cfs)	OUTFLOW RATE (cfs)	POND SURFACE ELEVATION (ft)
			1
0 2	.000	.000	104.670
5	.000	.000	1 104.670
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. 10	.000	.000	104.670
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67	.000	.000	1 104.670
70	.000		1 104.670
70	.000	.000	1 104.670
74	.000	.000	1 104.670
74	.000	.000	1 104.670
79	.000	.000	104.670
82	.000	.000	1 104.670
84	.000		1 104.670
86		.000	1 104.670
89	.000	.000	1 104.670
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149	.000	.000	1 104.670
151	.000	.000	104.670
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156	.000	.000	104.670
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175	.000	.000	104.670
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221	.000	.000	104.670
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228	.000	.000	104.670
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245	.000	.000	104.670
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252	.000	.000	1 104.670
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281	.000	.000		104.670
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283	.000	.000		
286	.000	.000		104.670
288	.000	.000		104.670
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293	.000	.000		104.670
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295	.000	.000		104.670
298	.000	.000		104.670
300	.000	.000		104.670
302	.000	.000		104.670
305	.000	.000		104.670
307	.000	.000		104.670
310	.000	.000		104.670
312	.001	.000		104.670
314	.001	.000		104.670
317	.001	.000		104.670
				Collins on the former sectors
319	.002	.000		104.670
322	.002	.000		104.670
324	.002	.000		104.670
326	.002	.000		104.670
329	.003	.001		104.670
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331	.003	.001		
334	.004	.001		104.670
336	.004	.001		104.671
338	.004	.001		104.671
341	.004	.001		104.671
				the second state of the second second
343	.005	.001		104.671
346	.005	.002		104.671
348	.005	.002		104.671
350	.006	.002		104.671
353	.006	.002		104.671
355	.007	.002		104.672
358	.007	.002		104.672
360	.007	.003		104.672
362	.008	.003		104.672
	.009	.003		104.672
365				
367	.009	.003		104.672
370	.009	.004		104.672
372	.010	.004		104.673
374	.010	.004		_ 104.673
377	.011	.005		104.673
379	.011	.005		104.673
382	.011	.005		104.673
384	.012	.005		104.674
386	.012	.006		104.674
389	.013	.006		104.674
	.013	.006		104.674
391				
394	.013	.007		104.674
396	.014	.007		104.675
398	.014	.007		104.675
401	.014	.008		104.675
403	.015	.008		104.675
406	.015	.008		104.675
408	.015	.009		104.676
410	.016	.009		104.676
413	.016	.009		104.676
	.016			104.676
415		.010		
418	.017	.010		104.677
420	.017	.010		104.677
422	.020	.011		104.677
425	.021	.011		104.677
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427	.022	.012		104.678
430	.023	.012		104.678
432	.023	.013	2.16	104.678
434	.024	.013		104.679
437	.024	.014	Part in a state of	104.679
439	.025	.014	12	104.679
442	.025	.015		104.680

		000	015	1	104.680
444		.026	.015	-	104.680
446		.026	.016	1	
449		.027	.016	-	104.681
451		.027	.017	1	104.681
454		.028	.017	1	104.681
456		.028	.018		104.682
458		.029	.018	1	104.682
461		.029	.019	1	104.682
463		.030	.019	1	104.683
466		.030	.020	1	104.683
468		.030	.020	1	104.683
470		.031	.021	1	104.684
473		.031	.021	1	104.684
475		.032	.022	- i	104.684
478		.032	.022	- i	104.685
480		.032	.023	1	104.685
			.023	1	104.685
482		.036			104.686
485		.039	.024		
487		.040	.025		104.686
490		.041	.025		104.687
492		.041	.026		104.687
494		.042	.027		104.688
497		.042	.028	I	104.688
499		.043	.028	1	104.689
502		.043	.029	1 .	104.689
504		.044	.030	1	104.690
506		.045	.030	1	104.690
509		.045	.031	1	104.690
511		.047	.032	- i	104.691
514		.049	.032	- P	104.691
		.049	.033	- i	104.692
516					104.693
518		.051	.034		
521		.052	.035	1	104.693
523		.052	.036		104.694
526		.053	.037	1	104.694
528		.054	.037	1	104.695
530		.054	.038	1	104.695
533		.055	.039	1	104.696
535		.055	.040	1	104.696
538		.056	.040	1	104.697
540		.056	.041	1	104.697
542		.061	.042	i	104.698
545		.065	.043	i.	104.698
547		.066	.044	1	104.699
550		.067	.045		104.700
				1	104.700
552		.068	.046		
554		.069	.047	1	104.701
557		.069	.048		104.702
559		.070	.049		104.702
562		.071	.050	1	104.703
564		.071	.051	1	104.704
566		.072	.052	1	104.704
569		.073	.053	1	104.705
571		.076	.054	1	104.706
574		.081	.055	1	104.706
576		.083	.056	1	104.707
578		.085	.058		104.708
			.059	1	104.709
581		.086			
583		.086	.060		104.710
586		.087	.062		104.711
588		.088	.063		104.711
590		.089	.064		104.712
593		.090	.065	I	104.713
595		.090	.066	1	104.714
598		.091	.068	1.181	104.715
600		.092	.069	1	104.715
602		.107	.070	1	104.716
605		.116	.072	1	104.718
607		.120	.074	i	104.719
610		.122	.076	i	104.720
612		.122	.079	1	104.722
012		.125	.015		201.722

I

614	.124	.081	2. A. 1	10	4.723
614					
617	.125	.083	1		04.725
619	.126	.085			4.726
622	.127	.087	1	10	04.727
624	.128	.089	1	10	4.729
626	.130	.091	i		4.730
629	.131	.092			4.731
631	.144	.095			4.732
634	.166	.097	1		04.734
636	.177	.101	1	10	04.737
638	.182	.105	1	10	4.739
641	.184	.108	· · · · · ·	10	04.741
643	.186	.112	i		4.744
646	.188	.115			4.746
648	.189	.119			4.748
650	.191	.122	5 2		04.751
653	.193	.125		10	4.753
655	.194	.129	1	10	4.755
658	.196	.132	1	10	4.757
660	.198	.135	i i		4.759
662	.260	.139			4.762
665	.299	.146			4.766
667	.312	.153	1		4.771
670	.318	.161	1	10	4.776
672	.322	.168	1-	10	4.781
674	.326	.176			4.786
					4.791
677	.329	.183	1		
679	.332	.190			4.795
682	.335	.197		10	4.800
684	.338	.203	1 A A A A A A A A A A A A A A A A A A A	10	4.804
686	.341	.210	1.	10	4.808
689	.344	.216			4.812
691	.548	.227			4.820
			-		
694	.883	.250	1		4.835
696	1.056	.283	L	10	4.857
698	1.119	.321	1	10	4.882
701	1.152	.360	1	10	4.907
703	1.175	.397	~i		4.932
706	1.722	.447			4.965
708	3.730	.517			5.034
710	4.958	.573	· · · · ·		5.146
713	5.429	.640	1	10	5.281
715	5.677	.712	1.	10	5.424
718	5.844	.786	1	10	5.572
720	5.969	.861	i		5.722
722	3.093	.915			5.829
725	1.342	.934			5.867
727	.883	.936	1		5.873
730	.759	.935		10	5.869
732	.726	.932			5.864
734	.722	.929	1.00		5.858
737	.724	.926	i		5.852
739	.725	.923	2 B B		5.846
742	.726	.920			5.840
744	.727	.917	· 1.	10	5.834
746	.728	.914	1	10	5.829
749	.729	.912	i		5.823
751	.632	.908	-		5.816
754	.476	.903	1.1.1.1.1.1		5.806
756	.402	.896			5.793
758	.383	.889	1 (3)	10	5.778
761	.378	.881	1	10	5.763
763	.377	.874	i		5.748
766	.377	.867			5.734
			- 2 8 13		
768	.377	.860			5.719
770	.377	.853	10 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		5.705
773	.378	.846		10	5.691
775	.378	.839	5 1	10	5.678
778	.378	.832	- 1 m		5.664
780	.379	.825			5.651
782	.322	.818	1. S. S. S. S.		5.637
102	. 322	.010		10	5.057

797 .200 .803 1 790 .278 .786 1 792 .277 .788 1 794 .277 .788 1 797 .277 .789 1 799 .277 .759 1 802 .277 .759 1 804 .278 .732 1 806 .278 .733 1 806 .278 .733 1 1 811 .261 .731 1 1 814 .221 .217 .702 1 818 .211 .217 .702 1 823 .217 .668 1 1 830 .217 .668 1 1 833 .217 .666 1 1 840 .217 .668 1 1 843 .226 .636 1 1	
787 .280 .803 1 790 .277 .786 1 794 .277 .781 1 797 .277 .781 1 799 .277 .782 1 802 .277 .759 1 804 .278 .735 1 806 .278 .733 1 806 .278 .733 1 811 .261 .731 1 814 .234 .724 1 816 .218 .710 1 823 .216 .6655 1 826 .217 .668 1 830 .217 .666 1 833 .217 .666 1 840 .217 .668 1 843 .226 .636 1 <t< td=""><td>105.622</td></t<>	105.622
790 .278 .796 1 792 .277 .788 1 794 .277 .773 1 797 .277 .773 1 799 .277 .759 1 8004 .278 .752 1 8006 .278 .738 1 8014 .224 .774 1 814 .234 .724 1 818 .211 .717 1 818 .2121 .717 .669 1 826 .217 .6681 1 1 830 .217 .6661 1 1 838 .217 .6661 1 1 842 .224 .642 1 1 845 .226 .636 1 1 852 .215 .618 1 1	105.607
792 277 788 1 794 2777 773 1 1 799 2777 773 1 1 799 2777 773 1 1 802 2777 759 1 1 804 278 733 1 1 806 2778 733 1 1 806 278 733 1 1 801 261 771 1 1 811 2261 7717 702 1 1 814 2231 2161 6955 1 1 822 2177 6681 1 1 1 826 2177 6681 1 1 1 830 2177 6681 1 1 1 833 2177 6612 1 1 1 842 224 642 1 1 1 833 2177	105.591
794 .277 .781 1 797 .277 .766 1 802 .277 .766 1 804 .278 .752 1 806 .278 .733 1 806 .278 .733 1 814 .234 .724 1 814 .234 .724 1 816 .211 .717 1 828 .217 .668 1 828 .217 .661 1 833 .217 .666 1 836 .217 .661 1 840 .217 .661 1 842 .224 .642 1 847 .223 .630 1 842 .224 .642 1 845 .226 .636 1 <t< td=""><td>105.576</td></t<>	105.576
797 $.277$ $.773$ 1 799 $.277$ $.766$ 1 802 $.277$ $.759$ 1 804 $.278$ $.745$ 1 806 $.278$ $.733$ 1 1 811 $.261$ $.731$ 1 1 814 $.234$ $.724$ 1 1 818 $.218$ $.710$ 1 1 818 $.217$ $.6695$ 1 1 823 $.216$ $.6955$ 1 1 826 $.217$ $.6681$ 1 1 830 $.217$ $.6661$ 1 1 833 $.217$ $.6661$ 1 1 833 $.217$ $.6661$ 1 1 840 $.217$ $.6661$ 1 1 842 $.226$ $.630$ 1 1 847 $.223$	105.561
799 .277 .766 1 802 .278 .752 1 806 .278 .745 1 806 .278 .733 1 811 .261 .731 1 814 .234 .724 1 816 .221 .717 1 1 816 .221 .717 1 1 821 .217 .702 1 1 821 .217 .668 1 1 828 .217 .668 1 1 833 .217 .666 1 1 842 .224 .642 1 1 842 .224 .642 1 1 842 .224 .642 1 1 844 .217 .655 1 1 842 .226 .636 1 1 844 .211 .612 1 1 859 .204 .600 1 1 <tr< td=""><td>105.546</td></tr<>	105.546
902 277 $.759$ 1 1 804 $.278$ $.745$ 1 809 $.278$ $.733$ 1 811 $.261$ $.731$ 1 811 $.221$ $.717$ 1 814 $.234$ $.724$ 1 816 $.221$ $.717$ 1 818 $.218$ $.710$ 1 823 $.216$ $.695$ 1 824 $.217$ $.6681$ 1 825 $.217$ $.6661$ 1 830 $.217$ $.6661$ 1 833 $.217$ $.6661$ 1 834 $.217$ $.6661$ 1 840 $.217$ $.6661$ 1 842 $.224$ $.642$ 1 844 $.223$ $.630$ 1 845 $.226$ $.636$ 1 847 $.223$ $.630$ 1 852 $.215$ $.618$ 1 854 $.211$ $.612$ 1 855 $.207$ $.606$ 1 864 $.196$ $.589$ 1 866 $.192$ $.583$ 1 866 $.167$ $.538$ 1 874 $.188$ $.527$ 1 893 $.169$ $.577$ 1 1 874 $.189$ $.577$ 1 1 896 $.161$ $.527$ 1 1 898 $.153$ $.511$ 1 1 900	105.532
804 .278 .745 1 8066 .278 .745 1 809 .278 .733 1 811 .261 .731 1 814 .234 .724 1 816 .221 .717 1 1 816 .221 .717 1 1 821 .217 .702 1 1 822 .217 .681 1 1 826 .217 .661 1 1 833 .217 .666 1 1 833 .217 .666 1 1 840 .217 .648 1 1 842 .224 .642 1 1 847 .223 .630 1 1 842 .224 .642 1 1 844 .211 .618 1 1 845 .2215 .618 1 1 857 .207 .606	
806 .278 .745 1 8009 .278 .738 1 1 811 .261 .731 1 1 814 .234 .724 1 1 816 .221 .717 1 1 818 .218 .710 1 1 821 .217 .668 1 1 822 .217 .668 1 1 833 .217 .6661 1 1 833 .217 .6661 1 1 834 .217 .6661 1 1 840 .217 .648 1 1 8442 .224 .642 1 1 845 .226 .636 1 1 845 .226 .636 1 1 845 .221 .618 1 1 846 .211 .612 1 1 857 .207 .606 1 1	105.518
009 .278 .738 1 8111 .261 .731 1 814 .234 .724 1 816 .221 .717 1 1 818 .218 .710 1 1 821 .217 .702 1 1 823 .216 .695 1 1 826 .217 .668 1 1 828 .217 .6661 1 1 830 .217 .666 1 1 833 .217 .6661 1 1 842 .224 .664 1 1 842 .224 .664 1 1 844 .226 .636 1 1 842 .226 .636 1 1 852 .219 .624 1 1 854 .211 .612 1 1 857 .207 .606 1 1 866	105.504
811 .261 .731 1 814 .234 .724 1 816 .221 .717 1 818 .218 .710 1 822 .217 .702 1 823 .216 .695 1 826 .217 .688 1 828 .217 .661 1 830 .217 .6668 1 833 .217 .6668 1 838 .217 .6661 1 840 .217 .648 1 842 .224 .642 1 842 .224 .642 1 844 .211 .612 1 852 .215 .618 1 854 .211 .612 1 859 .204 .600 1 866 .192 .583 1 866 .192 .583 1 876 .176 .555 1	105.490
814 .234 .724 1 816 .221 .717 1 818 .218 .710 1 821 .217 .702 1 823 .216 .6955 1 826 .217 .688 1 826 .217 .668 1 833 .217 .6668 1 833 .217 .6661 1 838 .217 .6661 1 840 .217 .648 1 842 .224 .642 1 847 .223 .630 1 842 .226 .633 1 847 .223 .630 1 850 .219 .624 1 854 .211 .618 1 854 .211 .618 1 856 .192 .583 1 866 .192 .566 1 874 .192 .566 1	105.476
816 .221 .717 1 818 .218 .710 1 821 .217 .702 1 823 .216 .695 1 826 .217 .688 1 833 .217 .666 1 833 .217 .666 1 833 .217 .666 1 833 .217 .666 1 833 .217 .666 1 840 .217 .648 1 8442 .224 .648 1 844 .211 .612 1 847 .223 .630 1 852 .215 .618 1 854 .211 .612 1 855 .200 .595 1 1 854 .211 .612 1 1 854 .211 .612 1 1 864 .969 .983 1 1 866	105.462
818 .216 .710 1 821 .217 .702 1 823 .216 .695 1 826 .217 .688 1 830 .217 .661 1 833 .217 .666 1 833 .217 .666 1 838 .217 .6661 1 840 .217 .648 1 842 .224 .642 1 844 .226 .630 1 847 .223 .630 1 847 .223 .630 1 850 .219 .624 1 857 .207 .606 1 852 .211 .612 1 864 .196 .589 1 $862 .200 .595 1 864 .196 .589 1 874 .182 .566 1 874 .182 .566 1 105.448$	105.448
821 .217 .702 1 823 .216 .695 1 826 .217 .681 1 820 .217 .661 1 830 .217 .668 1 833 .217 .6668 1 835 .217 .6661 1 840 .217 .648 1 842 .224 .642 1 845 .226 .636 1 847 .223 .630 1 850 .219 .624 1 852 .215 .618 1 854 .211 .612 1 854 .211 .612 1 856 .192 .583 1 866 .192 .583 1 866 .192 .566 1 874 .162 .566 1 874 .162 .566 1 874 .169 .577 1	105.434
823 .216 .695 1 826 .217 .681 1 830 .217 .675 1 833 .217 .668 1 833 .217 .6661 1 838 .217 .6661 1 840 .217 .648 1 844 .224 .642 1 842 .224 .648 1 845 .226 .636 1 845 .226 .630 1 845 .226 .630 1 850 .211 .612 1 857 .207 .606 1 852 .204 .600 1 866 .192 .583 1 866 .192 .583 1 874 .182 .5660	105.419
823 .216 .695 1 826 .217 .681 1 830 .217 .675 1 833 .217 .668 1 833 .217 .6661 1 838 .217 .6661 1 840 .217 .648 1 844 .224 .642 1 842 .224 .648 1 845 .226 .636 1 845 .226 .630 1 845 .226 .630 1 850 .211 .612 1 857 .207 .606 1 852 .204 .600 1 866 .192 .583 1 866 .192 .583 1 874 .182 .5660	105.405
826 .217 .688 1 828 .217 .661 1 833 .217 .666 1 835 .217 .661 1 838 .217 .666 1 840 .217 .648 1 840 .217 .648 1 842 .224 .642 1 845 .226 .636 1 847 .223 .630 1 850 .219 .624 1 852 .215 .618 1 857 .207 .606 1 859 .204 .600 1 866 .192 .583 1 866 .192 .583 1 874 .189 .577 1 1 874 .192 .566 1 1 874 .192 .566 1 1 876 .179 .549 1 1 883 <	105.390
828.217.6811 830 .217.6681 835 .217.6611 836 .217.6611 840 .217.6641 842 .224.6421 842 .225.6361 847 .223.6301 850 .219.6241 854 .211.6121 857 .207.6061 852 .204.6001 862 .200.5951 864 .192.5831 866 .192.5831 866 .192.5661 874 .82.5661 876 .176.5551 881 .173.5491 888 .164.5331 890 .155.5161 900 .150.5061 900 .150.5061 900 .150.5061 900 .150.5061 900 .150.5061 900 .150.5061 900 .150.5061 900 .150.5061 900 .150.5061 900 .150.5061 900 .150.5061 900 .150.5061 911 .133.3981 924 .130<	105.376
830 $.217$ $.675$ 1 833 $.217$ $.666$ 1 833 $.217$ $.666$ 1 838 $.217$ $.665$ 1 840 $.217$ $.648$ 1 842 $.224$ $.642$ 1 845 $.226$ $.636$ 1 847 $.223$ $.630$ 1 850 $.219$ $.624$ 1 852 $.215$ $.618$ 1 854 $.211$ $.612$ 1 857 $.207$ $.606$ 1 859 $.204$ $.600$ 1 864 $.196$ $.589$ 1 864 $.196$ $.589$ 1 866 $.192$ $.583$ 1 866 $.179$ $.566$ 1 876 $.179$ $.566$ 1 876 $.179$ $.566$ 1 876 $.167$ $.538$ 1 883 $.169$ $.544$ 1 890 $.161$ $.527$ 1 890 $.164$ $.533$ 1 900 $.150$ $.506$ 1 900 $.150$ $.506$ 1 900 $.164$ $.485$ 1 910 $.144$ $.485$ 1 910 $.143$ $.469$ 1 911 $.137$ $.425$ 1 912 $.133$ $.398$ 1 924 $.130$ $.374$ 1 924	105.363
833 .217 .668 1 835 .217 .661 1 840 .217 .663 1 840 .217 .648 1 842 .224 .642 1 845 .226 .636 1 847 .223 .630 1 850 .219 .624 1 850 .219 .624 1 854 .211 .618 1 854 .211 .612 1 857 .207 .606 1 1 856 .192 .583 1 1 866 .192 .583 1 1 866 .192 .583 1 1 874 .182 .566 1 1 874 .182 .566 1 1 876 .176 .555 1 1 881 .164 .533 1 1 993 .158	105.349
835.217.6611 838 .217.6551 840 .217.6681 842 .224.6421 845 .226.6361 847 .223.6301 850 .219.6241 852 .215.6181 854 .211.6121 857 .207.6061 859 .204.6001 866 .192.5831 866 .192.5831 866 .192.5831 866 .192.5831 871 .186.5771 874 .182.5661 876 .179.5601 878 .176.5551 883 .169.5441 886 .167.5331 890 .161.5271 893 .155.5161 900 .150.5061 900 .150.5061 901 .144.4851 902 .146.4851 901 .141.4541 912 .133.3961 924 .130.3741 924 .130.3741 924 .122.321.11 934 .124.3311 943 .119.2941 943 .119 <td></td>	
838.217.6551 840 .217.6481 842 .224.6421 845 .226.6361 847 .223.6301 850 .219.6241 852 .215.6181 854 .211.6121 857 .207.6061 859 .204.6001 866 .192.5831 866 .192.5831 866 .192.5831 874 .189.5771 874 .182.5661 876 .179.5601 878 .176.5551 881 .173.5491 886 .167.5381 893 .158.5221 893 .158.5221 900 .150.5061 900 .150.5061 900 .153.5111 900 .146.4851 907 .143.4691 914 .137.4251 914 .133.3961 924 .130.3741 924 .126.3511 934 .124.3311 941 .120.3021 943 .119.2941	105.336
840.217.6481 842 .224.6421 845 .226.6361 847 .223.6301 850 .219.6241 852 .215.6181 854 .211.6121 857 .207.6061 859 .204.6001 862 .200.5951 864 .196.5891 866 .192.5831 866 .192.5661 876 .179.5661 876 .179.5601 878 .176.5551 883 .169.5441 886 .167.5381 890 .161.5271 893 .158.5221 900 .150.5061 907 .143.4691 907 .143.4691 914 .137.4251 914 .137.4251 924 .130.3741 924 .130.3741 924 .122.321.11 934 .122.321.11 941 .122.321.11 943 .119.294.11 943 .118.286.11	105.322
842 .224 .642 1 845 .226 .636 1 847 .223 .630 1 850 .219 .624 1 852 .215 .618 1 854 .211 .612 1 857 .207 .606 1 859 .204 .600 1 862 .200 .595 1 864 .196 .589 1 866 .192 .583 1 866 .192 .583 1 866 .192 .583 1 874 .186 .572 1 876 .179 .560 1 878 .176 .555 1 881 .167 .538 1 888 .164 .533 1 890 .151 .511 1 900 .150 .506 1 902 .148 .501 1 </td <td>105.309</td>	105.309
845.226.636 1 847 .223.630 1 850 .219.624 1 852 .215.618 1 854 .211.612 1 857 .207.606 1 859 .204.600 1 862 .200.595 1 864 .196.589 1 866 .192.583 1 874 .186.577 1 874 .182.566 1 876 .179.560 1 876 .179.560 1 876 .167.538 1 881 .173.549 1 886 .167.538 1 890 .161.527 1 893 .158.522 1 990 .161.501 1 900 .150.506 1 901 .143.469 1 902 .148.501 1 912 .133.398 1 914 .137.425 1 912 .131.386 1 924 .130.374 1 924 .130.374 1 924 .126.351 1 934 .122.	105.297
847.223.630 1 850 .219.624 1 852 .215.618 1 854 .211.612 1 857 .207.606 1 859 .204.600 1 862 .200.595 1 864 .196.589 1 866 .192.583 1 866 .192.583 1 871 .186.572 1 874 .182.566 1 876 .179.560 1 878 .176.555 1 881 .169.544 1 886 .167.538 1 893 .158.522 1 893 .158.522 1 900 .150.506 1 902 .146.485 1 902 .148.501 1 914 .137.425 1 917 .135.411 1 919 .133.398 1 924 .126.351 1 934 .124.331 1 936 .121.311 1 943 .119.294 1 943 .118.286 1	105.284
850.219.6241 852 .215.6181 854 .211.6121 857 .207.6061 859 .204.6001 862 .200.5951 864 .196.5891 866 .192.5831 866 .192.5831 871 .186.5771 874 .182.5661 876 .179.5601 878 .176.5551 883 .169.5441 886 .167.5381 890 .161.5271 893 .158.5221 894 .153.5111 900 .150.5061 900 .153.5111 900 .153.5111 907 .143.4691 914 .137.4251 917 .133.3981 924 .130.3741 924 .130.3741 924 .126.3511 938 .121.3111 941 .120.3021 943 .119.2941 946 .118.2861	105.272
852.215.618 1 854 .211.612 1 857 .207.606 1 859 .204.600 1 864 .196.589 1 864 .196.589 1 866 .192.583 1 866 .192.583 1 871 .186.572 1 874 .182.566 1 876 .179.560 1 878 .176.555 1 883 .169.544 1 886 .167.538 1 888 .164.533 1 893 .158.522 1 900 .150.506 1 900 .150.506 1 907 .143.469 1 910 .141.454 1 917 .135.411 1 914 .137.425 1 917 .135.362 1 924 .130.374 1 924 .126.351 1 934 .124.331 1 934 .124.331 1 936 .121.311 1 943 .119.294 1 943 .118.	105.260
854.211.612 1 857 .207.606 1 857 .207.606 1 859 .204.600 1 862 .200.595 1 864 .196.589 1 866 .192.583 1 866 .192.583 1 871 .186.572 1 874 .182.566 1 876 .176.555 1 878 .176.555 1 883 .169.544 1 886 .167.538 1 893 .158.522 1 893 .158.522 1 990 .161.527 1 990 .155.516 1 900 .150.506 1 900 .150.506 1 907 .143.465 1 910 .141.454 1 911 .133.398 1 924 .130.374 1 924 .130.374 1 934 .124.331 1 934 .124.331 1 946 .118.286	105.248
854.211.612 1 857 .207.606 1 857 .207.606 1 859 .204.600 1 862 .200.595 1 864 .196.589 1 866 .192.583 1 866 .192.583 1 871 .186.572 1 874 .182.566 1 876 .176.555 1 878 .176.555 1 883 .169.544 1 886 .167.538 1 893 .158.522 1 893 .158.522 1 990 .161.527 1 990 .155.516 1 900 .150.506 1 900 .150.506 1 907 .143.465 1 910 .141.454 1 911 .133.398 1 924 .130.374 1 924 .130.374 1 934 .124.331 1 934 .124.331 1 946 .118.286	105.236
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1133	.087	.098	1	104.735
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1162	.082	.092		104.731
1164	.082	.092	1	104.730
1166	.082	.091	1	104.730
1169	.081	.091	1	104.730
1171	.081	.090	1	104.730
1174	.080	.090		104.729
			1	104.729
1176	.080	.089	1	
1178	.080	.089	1	104.729
1181	.079	.088	1	104.728
1183	.079	.088	1	104.728
1186	.079	.088	1	104.728
1188	.078	.087	1	104.727
1190	.078	.087		104.727
1193	.077	.086	1	104.727
1195	.077	.086	1	104.727
1198	.077	.085	1	104.726
1200	.000	.083	1	104.725
1202	.000	.079	1	104.722
	.000	.076	1	104.720
1205			1	
1207	.000	.072	1	104.718
1210	.000	.069	1	104.715
1212	.000	.065	1	104.713
1214	.000	.062	1	104.711
1217	.000	.059	i	104.709
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1219				
1222	.000	.054	1	104.706
1224	.000	.051	1	104.704
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1234				
1236	.000	.040	1	104.697
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1246	.000	.033	1	104.692
1248	.000	.032	i i	104.691
		.030	1	104.690
1250	.000		1	
1253	.000	.029	1.1	104.689
1255	.000	.027	1	104.688
1258	.000	.026	1	104.687
1260	.000	.025	1	104.686
1262	.000	.024	1	104.686
1265	.000	.023	1 to 1000	104.685
1267	.000	.022	1	104.684
1270	.000	.021	1	104.684
1272	.000	.020	1	104.683
1274	.000	.019	1	104.682
1277	.000	.018	1	104.682
1279	.000	.017		104.681
1282	.000	.016	1	104.681
1284	.000	.015	1	104.680
1286	.000	.015	1	104.680
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1308	.000	.010	104.676
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1313	.000	.009	104.676
1315	.000	.008	104.675
1318	.000	.008	104.675
1320	.000	.007	104.675
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1370	.000	.003	104.672
1373	.000		104.672
1375	.000	.002	
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1380	.000	.002	104.671
1382	.000	.002	104.671
1385	.000	.002	104.671
1387	.000	.002	104.671
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100-Year Routing

1*******	*****	*****	PONDOPT	*******	******	******	
******	*******	******	Version 1.83	*******	******	******	
******	* * * * * * * * * *	COMPUTER-AI	DED HYDROLOGY &	A HYDRAULICS	******	*****	
PROJECT:	7845 RICHMO	ND RD					
User:	LandTech Re	sources					
Date:	07/21/2005	Thursday					
Time:	13:30:41						
Output:	RRP10.OUT				1. · · ·		

 ROUTING SUMMARY

 SIMULATION MODE

 FOR THE ABOVE CASE

STORM NUMBER	PEAK STAGE (ft)	PEAK STORAGE (ac-ft)	PEAK INFLOW (cfs)	PEAK OUTFLOW (cfs)	
1	105.873	.286	5.969	.936	

1******** ****** PONDOPT ***** ******* Version 1.83 ********************* COMPUTER-AIDED HYDROLOGY & HYDRAULICS ********** PROJECT: 7845 RICHMOND RD User: LandTech Resources Date: 07/21/2005 Thursday Time: 13:32:42 Output: RRP100.OUT SOLUTION FOR 1 STORMS. TIME INCREMENT: .040 Hours STORM NUMBER HYDROGRAPH IN FILE: RR100.DAT 1 ALLOWABLE PEAK PEAK RUNOFF TAILWATER DISCHARGE STORM INFLOW DURATION VOLUME STAGE NUMBER (cfs) (cfs) (min) (ft3) (ft) 8.748 1197.60 1 N/A .2021E+05 104.670 1****************************** PONDOPT ******* ****** ****** Version 1.83 ******* PROJECT: 7845 RICHMOND RD User: LandTech Resources Date: 07/21/2005 Thursday Time: 13:32:42 Output: RRP100.OUT Stage-Area-Discharge Filename: RRPOND.DAT TAILWATER STAGE: 104.670 feet. INITIAL STAGE: 104.670 feet. <<<<<<< > STORM 1 STORAGE STAGE VOLUME DISCHARGE (ft) (ac-ft) (cfs) 103.000 .0000 .0000 104.000 .8824E-01 .0000 104.670 .0000 .1539 105.000 .1882 .5000 106.000 .3004 1.000 106.400 .3488 1.140 107.000 .4254 12.44 108.000 .5638 15.37 1*********** ************* PONDOPT *****

PROJECT: 7845 RICHMOND RD User: Landtech Resources Date: 07/21/2005 Thursday Time: 13:32:42 Output: RRP100.OUT

TAILWATER STAGE: 104.670 feet. INITIAL STAGE: 104.670 feet.

MAXIMUM ELEVATION:	106.5	feet.
MAXIMUM INFLOW:	8.748	cfs.
MAXIMUM OUTFLOW:	2.233	cfs.
MAXIMUM STORAGE:	.3562	acre-feet.

CONTINUITY ERROR: .169E-04 percent.

TIME (min)		INFLOW RATE (cfs)	OUTFLOW RATE (cfs)	2	POND SURFACE ELEVATION (ft)
(1111)		(013)	(013)		(10)
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	2 5	.000	.000		104.670
	с 7	.000	.000		104.670
	.0	.000 .000	.000		104.670 104.670
	.2	.000	.000		104.670
	.4	.000	.000		104.670
	.4	.000	.000		104.670
	.9	.000	.000		104.670
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444	.061	.042		104.698
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449	.063	2 (C) (C) (C)	~ *	
451	.063	.045	1	104.700
454	.064	.046	1	104.700
456	.064	.047	· · · ·	104.701
458	.065	.047	1	104.701
461	.066	.048	in in	104.702
463	.066	.049	1	104.702
466	.067	.050	1	104.703
		.051		104.703
468	.068			
470	.068	.052	1	104.704
473	.069	.052		104.705
475	.069	.053	1	104.705
478	.070	.054	1	104.706
		.055	i	104.706
480	.071		1	
482	.078	.056	1	104.707
485	.083	.057		104.707
487	.085	.058	1	104.708
490	.086	.059	1	104.709
492	.087	.061	i i	104.710
494	.088	.062		104.711
497	.089	.063		104.712
499	.089	.064		104.712
502	.090	.066		104.713
504	.091	.067	- î.	104.714
506	.092	.068	1	104.715
509	.092	.069	- I	104.716
				104.716
511	.095	.070	1	
514	.099	.071	1	104.717
516	.101	.073	1	104.718
518	.102	.074		104.719
521	.103	.076	. I ~	104.720
				104.721
523	.104	.077		
526	.105	.078		104.722
528	.106	.079	1	104.722
530	.107	.081		104.723
533	.107	.082	1	104.724
				104.725
535	.108	.083		
538	.109	.084	1	104.726
540	.110	.086	201	104.726
542	.119	.087	× 1	104.727
545	.125	.089		104.728
	.127	.090		104.730
547				
550	.129	.092		104.731
552	.130	.094	1	104.732
554	.131	.096	1	104.733
557	.132	.097	· · ·	104.734
559	.132	.099	1	104.735
562	.133	.100		104.736
564	.134	.102	1	104.737
	.135	.104		104.738
566				
569	.136	.105	1	104.739
571	.141	.107		104.740
574	.150	.108		104.742
576	.155	.111	. 1	104.743
				104.744
578	.156	.113		
581	.158	.115	- 123	104.746
583	.159	.117	1	104.747
586	.160	.119		104.748
588	.161	.121	1	104.750
		.123		104.751
590	.162			
593	.163	.125		104.752
595	.164	.126	1	104.753
598	.165	.128	1	104.755
600	.166	.130	1	104.756
602	.192	.132	1	104.757
			1	
605	.209	.135	1	104.759
607	.214	.139	1	104.762
610	.217	.143		104.764
612	.218	.146	1 (A. A)	104.766

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614	.220		.149		the second
617	.221		.153		104.771
619	.222		.156		104.773
622	.224		.159		104.775
624	.225		.162		104.777
626	.226		.165		104.779
629	.228		.168		104.781
631	.251		.171		104.783
					the second se
634	.288		.176		104.786
636	.306		.182		104.790
638	.313		.188		104.794
641	.316		.194		104.798
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643	.319		.200		104.802
646	.321		.205		104.805
648	.323		.211		104.809
650	.325		.216		104.813
653	.327		.221		104.816
655	.329		.226		104.819
658	.331		.231		104.823
660	.332		.236		104.826
662	.436		.243		104.830
665	.500		.253		104.837
667	.520		.265		104.845
	. 528		.278		104.853
670					a second barries in
672	.533		.289		104.861
674	.537		.301		104.869
677	.541		.312		104.876
					 A second research who can
679	.544		.323		104.883
682	.548		.334		104.890
684	.551		.344		104.897
686	.555		.354		104.903
689	.558		.363		104.910
691	.886		.380		104.921
694	1.419		.416		104.945
696	1.688		.470		104.980
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698	1.778		.509		105.018
701	1.819		.528		105.056
703	1.845	1	.547	1 S. 1	105.094
706	2.684		.572	10.00	105.144
				1. In 1978	
708	5.743		.625		105.251
710	7.545		.713		105.427
713	8.168		.818		105.636
715	8.455		.927		105.855
718	8.627		1.025		106.072
720	8.748		1.098		106.280
722	4.521		1.583		106.424
725	1.958		2.233	1	106.458
727	1.286		1.993		106.445
730	1.103		1.680		106.429
732	1.054		1.444		106.416
734	1.048		1.290		106.408
737	1.049		1.195	5 m 1	106.403
739	1.050		1.140		106.400
742	1.051		1.139		106.397
744	1.052		1.138		106.395
746	1.053		1.137		106.393
749	1.054		1.137		106.390
751	.914		1.135		106.386
754	.688		1.132		106.377
756	.581		1.127		106.364
758	.553		1.122		106.348
761	.545		1.117	Jacks 2	106.333
763	.544		1.111	1	106.317
566	.544		1.106	1	106.302
766	.544		1.100	i	106.287
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768	E A A		1.095		106.272
768 770	.544				
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768 770 773 775	.544		1.090 1.085		106.257 106.242
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958 162 556 105.073 962 162 531 105.073 962 161 525 105.051 967 161 520 105.030 972 160 515 105.030 974 159 505 105.009 977 159 498 104.998 984 157 467 104.998 984 155 403 104.999 986 156 425 104.959 996 156 425 104.951 991 155 413 104.927 996 154 378 104.927 996 152 338 104.927 1001 153 357 104.919 1006 152 338 104.929 1010 151 330 104.827 1013 150 313 104.829 1014 129 305 104.825 <t< td=""><td></td><td>1.64</td><td>E 47</td><td></td><td>105 005</td></t<>		1.64	E 47		105 005
960 162 .536 105.062 965 161 .525 105.062 967 161 .520 105.040 970 160 .515 105.040 974 .159 .505 105.040 974 .159 .408 104.999 977 .159 .402 104.989 979 .156 .422 104.989 986 .156 .423 104.959 986 .156 .423 104.959 986 .156 .423 104.959 986 .156 .423 104.927 986 .154 .376 104.921 1001 .153 .357 104.929 1002 .152 .338 104.829 1003 .152 .338 104.829 1004 .151 .330 104.829 1005 .152 .348 104.829 1006 .152 .348					
960 .162 .536 105.062 965 .161 .525 105.062 965 .161 .520 105.040 970 .160 .515 105.019 974 .159 .055 105.029 977 .159 .498 104.999 979 .158 .462 104.999 979 .156 .439 104.999 986 .156 .439 104.999 999 .156 .425 104.999 991 .155 .413 104.991 994 .155 .413 104.912 994 .153 .367 104.912 996 .154 .389 104.927 998 .154 .338 104.921 1006 .152 .367 104.921 1010 .151 .330 104.822 1011 .150 .313 104.821 1012	958	.163	.542		105.084
9e2 $1e2$ $1e3$ $1e3.6e3$ $9e7$ $1e1$ 525 $1e3.6e3$ $9e7$ $1e6$ 515 $1e3.6e3$ 972 $1e6$ 515 $1e3.6e3$ 972 $1e3$ 505 $1e3.6e3$ 977 $1e39$ 488 $1e3.6e3$ 977 $1e39$ 482 $1e3.6e3$ 982 157 $4e7$ $1e4.8e8$ 982 $1e57$ $4e7$ $1e4.8e8$ 984 $1e55$ $4e13$ $1e4.8e8$ 986 $1b56$ $4a39$ $1e4.859$ 989 $1b56$ $4a25$ $1e4.859$ 999 $1b56$ $4a25$ $1e4.859$ 9994 $1b55$ $4e13$ $1e4.827$ 998 154 378 $1e4.827$ 998 152 338 $1e4.827$ 998 152 338 $1e4.899$ 1000 151 330 $1e4.899$ 1008 152 338 $1e4.899$ 1010 151 330 $1e4.877$ 1018 149 298 $1e4.877$ 1022 144 2291 $1e4.867$ 1022 144 2260 $1e4.827$ 1032 146 2260 $1e4.828$ 1037 145 2255 $1e4.828$ 1032 146 2260 $1e4.828$ 1032 146 2260 $1e4.828$ 1034 142 2277 $1e4.828$ 1034 146 2260 $1e4.828$ <t< td=""><td>960</td><td>.162</td><td>.536</td><td>1</td><td>105.073</td></t<>	960	.162	.536	1	105.073
965161.525105.040970160.515105.040972160.510105.019974.159.505105.019977.159.488104.999979.158.482104.899984.157.467104.989984.155.439104.659986.156.429104.659986.155.403104.642994.155.403104.942994.155.403104.942994.155.403104.942994.154.376104.9121001.153.357104.9121003.153.357104.9211006.152.338104.8231010.151.330104.8241013.150.313104.8211020.149.298104.8251022.148.299104.8621025.148.284104.8531030.147.272104.8621031.146.266104.8451032.146.266104.8451034.146.260104.8451035.144.243104.8531030.147.272104.8621034.146.266104.8451034.146.260104.8451034.146.223104.8531049.142.227104.825 <t< td=""><td></td><td></td><td></td><td></td><td></td></t<>					
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970160.515105.019 974 .159.505105.019 974 .159.505105.019 977 .159.488104.999 979 .159.467104.989 984 .157.452104.959 986 .156.439104.959 986 .156.425104.959 999 .155.400104.951 994 .155.400104.951 994 .155.400104.921 996 .154.378104.921 1001 .153.3571004.921 1003 .152.338104.921 1006 .152.338104.893 1010 .151.330104.893 1010 .151.330104.893 1013 .150.313104.872 1022 .148.2281104.862 1025 .148.2281104.862 1022 .146.2261104.862 1032 .146.2660104.842 1034 .146.260104.842 1037 .145.255104.835 1042 .144.245104.823 1044 .143.240104.822 1046 .143.227104.845 1037 .145.255104.835 1044 .143.240104.822 1046 .133.202104.817 1056 .141.219104.823 <td>967</td> <td>.161</td> <td>.520</td> <td>1</td> <td>105.040</td>	967	.161	.520	1	105.040
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979.158.4621 104.978982.157.4671 104.978984.157.4521 104.969986.156.4391 04.959999.155.4131 04.942994.155.4131 04.942994.155.4131 04.942996.154.3891 104.9121001.153.3671 104.9121006.152.3481 104.9191006.152.3381 104.8991010.151.3301 104.8911010.151.3301 104.8921010.151.3301 104.8921010.151.3301 104.8951010.151.3301 104.8951010.151.3301 104.8951010.151.1331 104.8771018.149.3051 104.8621022.148.2911 104.8621022.148.2841 104.8621037.145.2551 104.8631039.145.2501 104.8621044.143.2211 104.8221049.142.2271 104.8221049.142.2271 104.8221044.143.2231 104.8221049.142.2271 104.8221049.142.2271 104.8221044.143.2201 104.8221045.138.1991 04.817 <t< td=""><td>977</td><td>159</td><td>498</td><td></td><td>104.999</td></t<>	977	159	498		104.999
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984 .157 .452 1 104.959 986 .156 .439 1 104.951 991 .155 .413 1 04.931 994 .155 .400 1 04.934 996 .154 .389 1 04.931 996 .154 .378 1 04.931 1001 .153 .367 1 04.931 1006 .152 .348 1 04.939 1006 .152 .338 1 04.893 1010 .151 .330 1 04.888 1013 .150 .313 1 04.867 1022 .148 .298 1 04.867 1022 .148 .291 1 04.867 1030 .147 .272 1 04.8653 1030 .147 .272 1 04.865 1032 .146 .260 1 04.853 1032 .146 .260 1 04.845 1031 .142 .227 1 04.831 1034 .146 </td <td></td> <td></td> <td></td> <td></td> <td></td>					
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554 <th< td=""><td>989</td><td>.156</td><td></td><td>1</td><td></td></th<>	989	.156		1	
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396 154 399 104.927 996 154 376 104.919 1001 153 367 104.919 1003 153 357 104.905 1006 152 338 104.999 1008 152 338 104.893 1010 151 330 104.893 1013 150 321 104.892 1015 150 3313 104.877 1018 149 2398 104.877 1022 149 2298 104.862 1025 148 2291 104.862 1025 148 2244 104.862 1022 146 2266 104.842 1032 146 2266 104.842 1032 146 2266 104.842 1033 145 2255 104.833 1042 144 245 104.833 1044 143 2245 104.833 1044 143 223 104.828 1049 142 2231 104.828 1049 142 2231 104.826 1049 142 223 104.827 1056 139 205 104.803 1070 138 199 104.801 1066 139 205 104.801 1066 139 205 104.801 1070 138 199 104.801 1075 134 183 104.797 </td <td>994</td> <td>155</td> <td>400</td> <td>1</td> <td>104.934</td>	994	155	400	1	104.934
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1013.150.321 104.872 1015.150.313 104.8771018.149.305 104.8721020.149.298 104.8621022.148.284 104.8621025.148.284 104.8581027.147.278 104.8491032.146.266 104.8491032.146.266 104.8381039.145.255 104.8381039.145.255 104.8381044.143.240 104.8281046.143.2231 104.8221051.142.2231 104.8171056.141.219 104.8141058.140.212 104.8071066.139.208 104.8071066.139.208 104.7971070.138.199 104.8071066.139.208 104.7911077.136.193 104.7911078.136.193 104.7921087.133.176 104.7821090.133.176 104.7821091.133.176 104.7821092.133.176 104.7821093.104.794.104.785 104.7761104.130 </td <td>1010</td> <td>.151</td> <td>.330</td> <td></td> <td>104.888</td>	1010	.151	.330		104.888
1015 150 313 104.877 1018 149 305 104.877 1020 149 298 104.877 1022 148 291 104.867 1022 148 291 104.867 1025 $.148$ $.294$ 104.863 1025 $.148$ $.294$ 104.853 1030 $.147$ $.272$ 104.849 1032 $.146$ $.266$ 104.849 1032 $.146$ $.266$ 104.842 1037 $.145$ $.255$ 104.831 1042 $.144$ $.245$ 104.831 1044 $.143$ $.240$ 104.831 1044 $.143$ $.240$ 104.822 1051 $.142$ $.231$ 104.821 1056 $.141$ $.215$ 104.812 1056 $.141$ $.212$ 104.811 1058 $.140$ $.212$ 104.813 1066 $.139$ $.205$ 104.803 1070 $.138$ $.199$ 104.803 1077 $.138$ $.199$ 104.797 1078 $.136$ $.193$ 104.797 1078 $.134$ $.181$ 104.797 1077 $.134$ $.188$ 104.797 1085 $.134$ $.181$ 104.797 1073 $.134$ $.181$ 104.797 1074 $.134$ $.181$ 104.797 1075 $.136$ $.193$ 104.797 1085 $.141$ </td <td></td> <td></td> <td></td> <td>i</td> <td>104 882</td>				i	104 882
1016.149.305104.8721020.149.298104.8721022.148.291104.8671025.148.284104.8531027.147.278104.8531030.147.272104.8451032.146.266104.8451033.145.255104.8451034.146.260104.8451039.145.255104.8381044.143.240104.8281046.143.235104.8251046.141.223104.8251051.142.221104.8221054.141.219104.8141058.140.212104.8121066.139.208104.8071066.138.202104.8031070.138.199104.7971078.136.193104.7941085.134.183104.7941085.134.185104.7941085.134.166104.7991085.134.168104.7941099.133.176104.7861099.131.170104.7861099.131.170104.7861099.131.172104.7861099.131.166104.7761106.129.163104.7761111.128.160104.7771114.128.160104.77					
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1030.147.272I 104.849 1032 .146.266I104.845 1034 .146.260I104.845 1037 .145.255I104.838 1039 .145.250I104.831 1042 .144.245I104.831 1044 .143.240I104.828 1046 .143.235I104.825 1049 .142.231I104.825 1051 .142.227I104.820 1054 .141.219I104.817 1056 .141.219I104.817 1056 .140.215I104.812 1061 .140.212I104.812 1066 .139.208I104.805 1066 .139.205I104.803 1070 .138.199I104.803 1077 .136.193I104.797 1078 .136.193I104.792 1085 .134.183I104.792 1085 .134.181I104.786 1099 .133.176I104.786 1099 .131.170I104.782 1099 .131.166I104.771 1104 .130.167I104.782 1099 .131.176I104.776 1099 .131.166I	1027	.147	.278	1.1	104.853
1032.146.266 104.845 1034 .146.260 104.845 1039 .145.255 104.835 1042 .144.245 104.835 1042 .143.240 104.828 1046 .143.235 104.825 1049 .142.231 104.825 1054 .141.223 104.822 1054 .141.219 104.812 1056 .141.215 104.812 1066 .139.206 104.803 1066 .139.205 104.803 1070 .138.199 104.803 1070 .136.193 104.794 1075 .136.193 104.794 1082 .135.188 104.794 1082 .135.186 104.794 1082 .135.186 104.794 1082 .135.186 104.794 1099 .133.176 104.784 1099 .131.172 104.784 1099 .131.172 104.786 1094 .132.174! 104.784 1099 .131.176! 104.784 1099 .131.176! 104.784 1099 .131.176! 104.776		147	272	í.	104 849
1034.146.260 104.842 1037 .145.255 104.835 1039 .145.255 104.835 1042 .144.245 104.831 1044 .143.235 104.825 1046 .143.235 104.825 1051 .142.227 104.822 1051 .142.223 104.822 1054 .141.223 104.814 1056 .141.219 104.812 1061 .140.215 104.812 1066 .139.206 104.807 1066 .139.205 104.803 1070 .138.199 104.801 1073 .137.196 104.799 1075 .136.193 104.797 1078 .136.193 104.794 1080 .135.188 104.794 1087 .134.181 104.784 1090 .133.176 104.784 1090 .133.176 104.784 1099 .131.166 104.784 1099 .131.166 104.784 1099 .131.166 104.774 1104 .130.167 104.776 1104 .130.167 104.786					
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1039.145.2501 104.835 1042 .144.2451 104.835 1044 .143.2401 104.828 1046 .143.2351 104.828 1049 .142.2311 104.822 1051 .142.2271 104.820 1054 .141.2231 104.817 1056 .141.2191 104.814 1058 .140.2121 104.814 1063 .139.2081 104.807 1066 .139.2081 104.807 1066 .138.2021 104.803 1070 .138.1991 104.797 1070 .136.1931 104.797 1078 .136.1931 104.794 1080 .135.1881 104.794 1080 .135.1861 104.794 1087 .134.1811 104.784 1099 .133.1761 104.784 1099 .131.1671 104.784 1099 .131.1661 104.778 1104 .130.1671 104.784 1099 .131.1661 104.778 1104 .130.1671 104.785 1099 .131.1661 104.778 1104 .130.1671 104.786	1037	.145	.255	1.1	104.838
1042.144.245104.831 1044 .143.240104.828 1046 .143.235104.828 1046 .143.235104.825 1049 .142.231104.825 1051 .142.227104.820 1054 .141.223104.817 1056 .141.215104.812 1061 .140.215104.812 1061 .140.212104.812 1066 .139.208104.807 1066 .138.202104.803 1070 .138.199104.803 1070 .136.193104.797 1075 .136.193104.791 1080 .135.188104.794 1082 .135.185104.794 1085 .134.181104.781 1090 .133.176104.786 1092 .131.170104.781 1092 .131.176104.781 1092 .131.166104.771 1104 .130.167104.781 1099 .131.176104.781 1099 .129.165104.771 1104 .120.167104.776 1104 .127.159104.775 1116 .127.156104.775 1116 .127.156104.773					104 835
1044.143.240104.828 1046 .143.235.104.825 1049 .142.231.104.825 1051 .142.227.104.820 1054 .141.223.104.817 1056 .141.219.104.814 1058 .140.215.104.812 1061 .140.212.104.810 1066 .139.208.104.807 1066 .138.202.104.803 1070 .138.199.104.803 1070 .138.199.104.803 1070 .138.199.104.797 1076 .136.193.104.797 1078 .136.193.104.796 1080 .135.188.104.791 1087 .134.183.104.791 1087 .134.183.104.784 1099 .131.176.104.786 1099 .131.176.104.784 1099 .131.168.104.784 1099 .131.168.104.778 1102 .131.168.104.778 1104 .130.167.104.786 1099 .129.163.104.777.114.128.162.104.776.116.127.159.104.775.116.127.159.104.775.1116.127.156.104.773					
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1049 $.142$ $.231$ $ $ 104.822 1051 $.142$ $.227$ $ $ 104.820 1054 $.141$ $.223$ $ $ 104.817 1056 $.141$ $.219$ $ $ 104.814 1058 $.140$ $.215$ $ $ 104.812 1061 $.140$ $.212$ $ $ 104.812 1063 $.139$ $.206$ $ $ 104.805 1066 $.139$ $.205$ $ $ 104.803 1070 $.138$ $.199$ $ $ 104.803 1070 $.138$ $.199$ $ $ 104.797 1078 $.136$ $.193$ $ $ 104.794 1080 $.135$ $.188$ $ $ 104.792 1080 $.135$ $.188$ $ $ 104.792 1080 $.135$ $.188$ $ $ 104.792 1080 $.135$ $.188$ $ $ 104.792 1087 $.134$ $.181$ $ $ 104.782 1090 $.133$ $.176$ $ $ 104.786 1092 $.133$ $.176$ $ $ 104.786 1092 $.131$ $.168$ $ $ 104.781 1092 $.131$ $.168$ $ $ 104.786 1092 $.133$ $.177$ $ $ 104.786 1092 $.133$ $.176$ $ $ 104.786 1092 $.131$ $.166$ $ $ 104.776 1104 $.132$ $.177$ $ $ 104.786 1099 <t< td=""><td>1046</td><td>.143</td><td>.235</td><td>1</td><td>104.825</td></t<>	1046	.143	.235	1	104.825
1051 $.142$ $.227$ $ $ 104.820 1054 .141.223 $ $ 104.817 1056 .141.219 $ $ 104.814 1058 .140.215 $ $ 104.812 1061 .140.212 $ $ 104.812 1061 .140.212 $ $ 104.810 1063 .139.208 $ $ 104.801 1066 .139.205 $ $ 104.803 1070 .138.199 $ $ 104.803 1070 .138.199 $ $ 104.799 1075 .136.193 $ $ 104.799 1076 .136.190 $ $ 104.794 1080 .135.188 $ $ 104.792 1085 .134.181 $ $ 104.792 1085 .134.183 $ $ 104.792 1087 .133.176 $ $ 104.788 1090 .133.176 $ $ 104.786 1092 .133.176 $ $ 104.784 1092 .131.168 $ $ 104.784 1099 .131.170 $ $ 104.784 1104 .130.167 $ $ 104.781 1104 .130.167 $ $ 104.784 1099 .131.170 $ $ 104.781 1104 .130.167 $ $ 104.776 1104 .129.163 $ $ 104.776 1104 .128<				1	104 822
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1058 $.140$ $.215$ 104.812 1061 $.140$ $.212$ 104.810 1063 $.139$ $.208$ 104.807 1066 $.139$ $.205$ 104.803 1066 $.138$ $.202$ 104.803 1070 $.138$ $.199$ 104.801 1070 $.138$ $.199$ 104.801 1073 $.137$ $.196$ 104.797 1076 $.136$ $.193$ 104.797 1078 $.136$ $.190$ 104.796 1080 $.135$ $.188$ 104.794 1082 $.135$ $.185$ 104.792 1085 $.134$ $.183$ 104.791 1087 $.134$ $.183$ 104.789 1090 $.133$ $.176$ 104.786 1092 $.133$ $.176$ 104.782 1092 $.133$ $.176$ 104.782 1094 $.132$ $.174$ 104.781 1092 $.133$ $.176$ 104.781 1094 $.132$ $.172$ 104.781 1094 $.132$ $.172$ 104.781 1094 $.132$ $.165$ 104.771 1104 $.130$ $.167$ 104.781 1104 $.129$ $.165$ 104.777 1104 $.128$ $.162$ 104.777 1114 $.128$ $.162$ 104.775 1114 $.126$ $.156$ 104.773		141	.219	1	104.814
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PROJECT: 7845 RICHMON	ND RD				
Manuel Translerah Da					

User: LandTech Resources Date: 07/21/2005 Thursday Time: 13:32:42 Output: RRP100.OUT

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ROUTING SUMMARY	
SIMULATION MODE	
FOR THE ABOVE CASE	

STORM NUMBER	PEAK STAGE (ft)	PEAK STORAGE (ac-ft)	PEAK INFLOW (cfs)	PEAK OUTFLOW (cfs)
1	106.458	.356	8.748	2.233

Design BMP #2

LandTech Resources, Inc.

Surveying • Engineering • GPS

5810-F Mooretown Road, Williamsburg, VA 23188 Phone: (757) 565-1677 Fax: (757) 565-0782 web: landtechresources.com

PROJECT NAME	05-00	

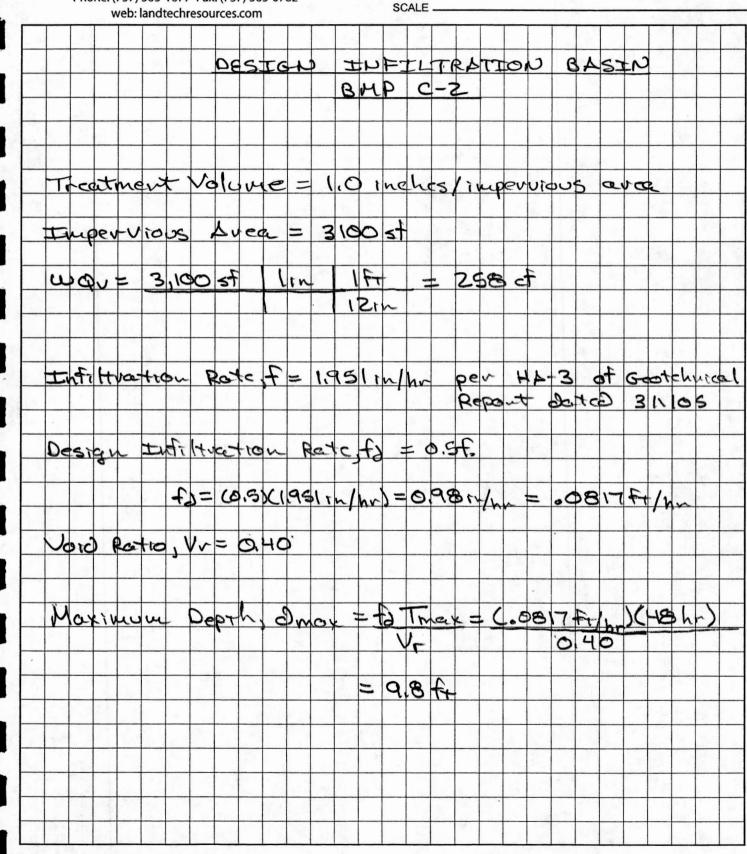
PROJECT NO.__

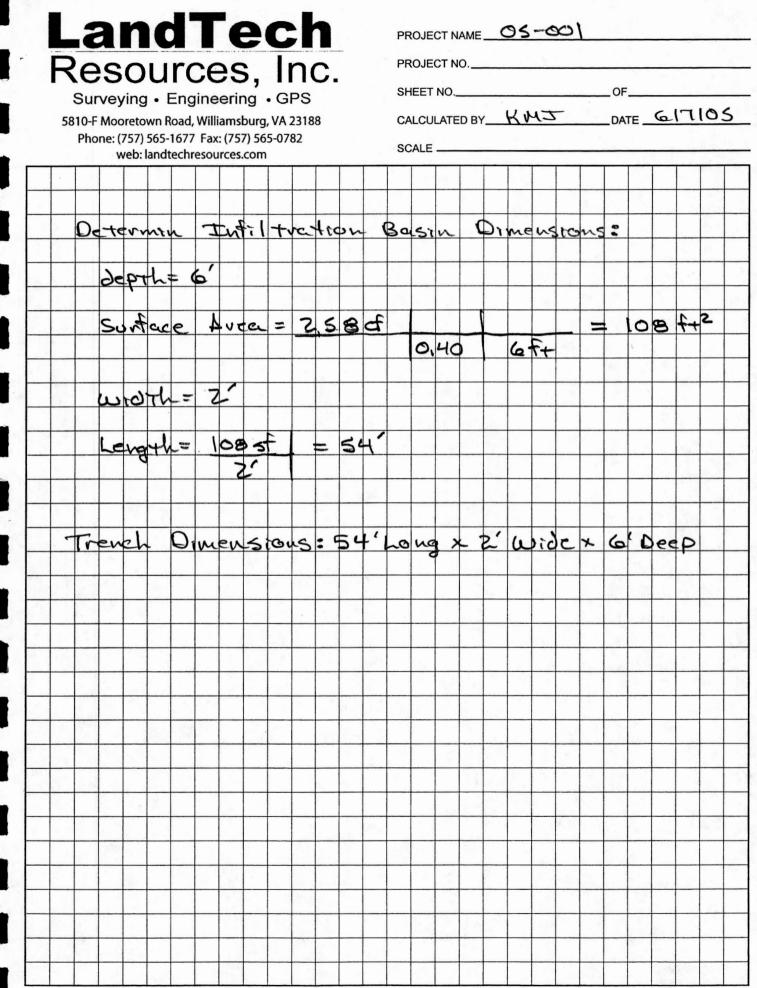
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CALCULATED BY KMJ

OF

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			CALCULATE	D BY	DATE
			CHECKED BY	KWD	DATE 61710
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	G	rvæss	.20	<u>-23</u>	.05
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S= 2.3 %					
Tc =12,5 min.					
CHANNEL FLOW					
H = .7 ft. L = (40 ft.)					
Tc= 2.5 min.				,	
Tc= 15 min.					
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i ₁₀ = 5 1 in/hr					
(
Q=CA1=(.37)(.3	• Ac.)(5.1 in/h	r) (C _r 1.0) C ₂ for	storms 25 yr+
			T		Manual Pg. 1-11)
Q= 0.57cfs					
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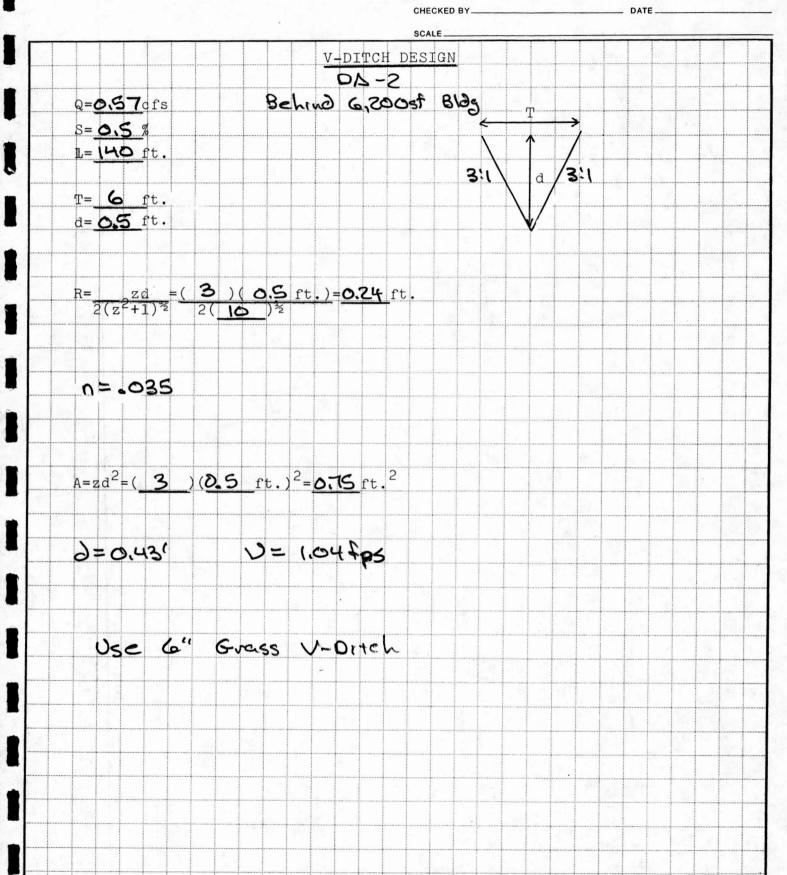
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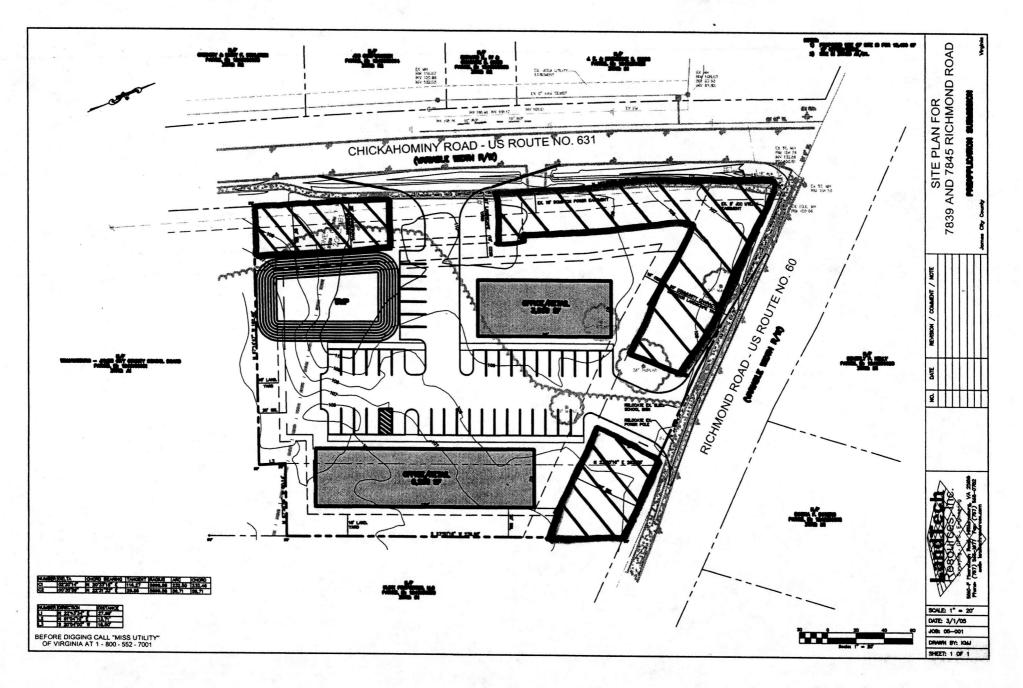
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CALCULATED BY	DATE



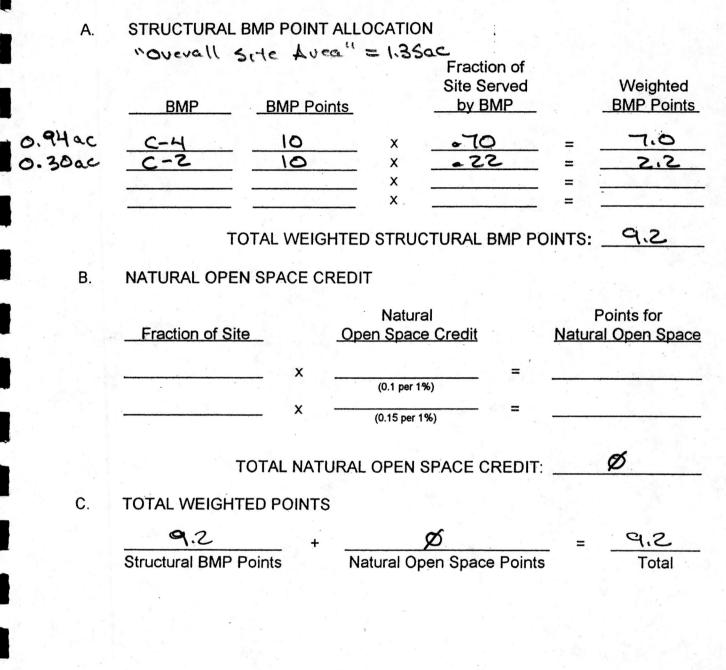


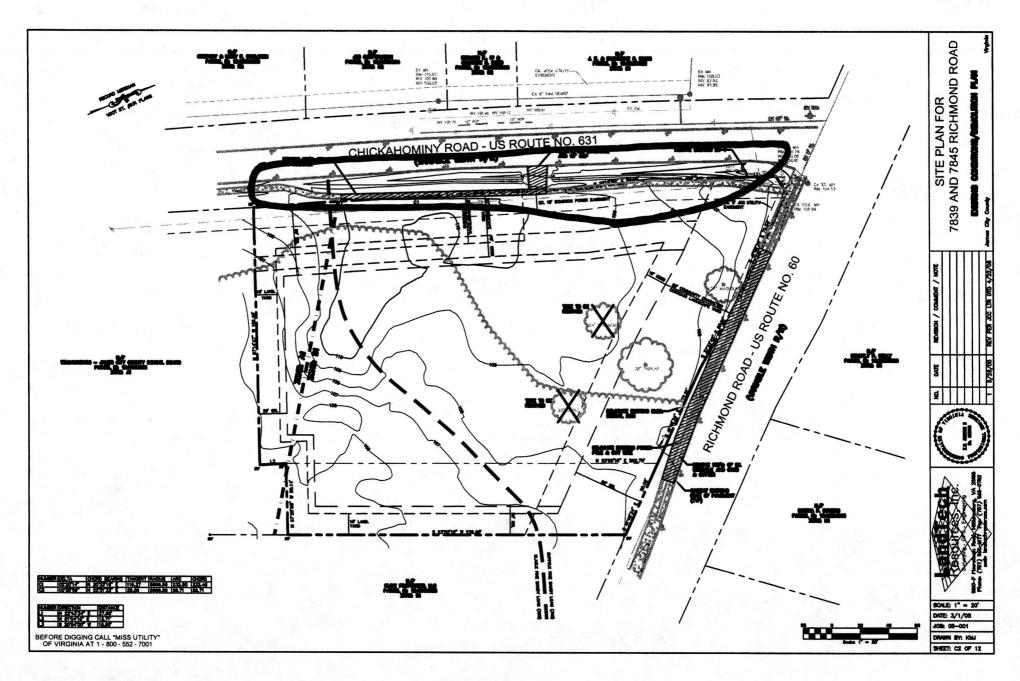
COMMUNITY CHARACTER CORRIDOR + LANDSCAPE YARD AREA

LandTech PROJECT NAME 05-001 Resources, Inc. PROJECT NO. SHEET NO.____ OF____ Surveying • Engineering • GPS CALCULATED BY KMJ DATE 6/7/05 5810-F Mooretown Road, Williamsburg, VA 23188 Phone: (757) 565-1677 Fax: (757) 565-0782 SCALE web: landtechresources.com Landscape fords that cannot Area TW and be developed = 0.40 ac Meeting with DAIL 16105 the 0.40ac with Bill Cain of Per The JECED on refevenced above 616105 subtract from th 4:11 1.75 ac be to obtain 135ac tor B an 1YC avea 5 Sveel of 11 Overall BMA Site Point System Celeplations

James City County BMP Guidelines

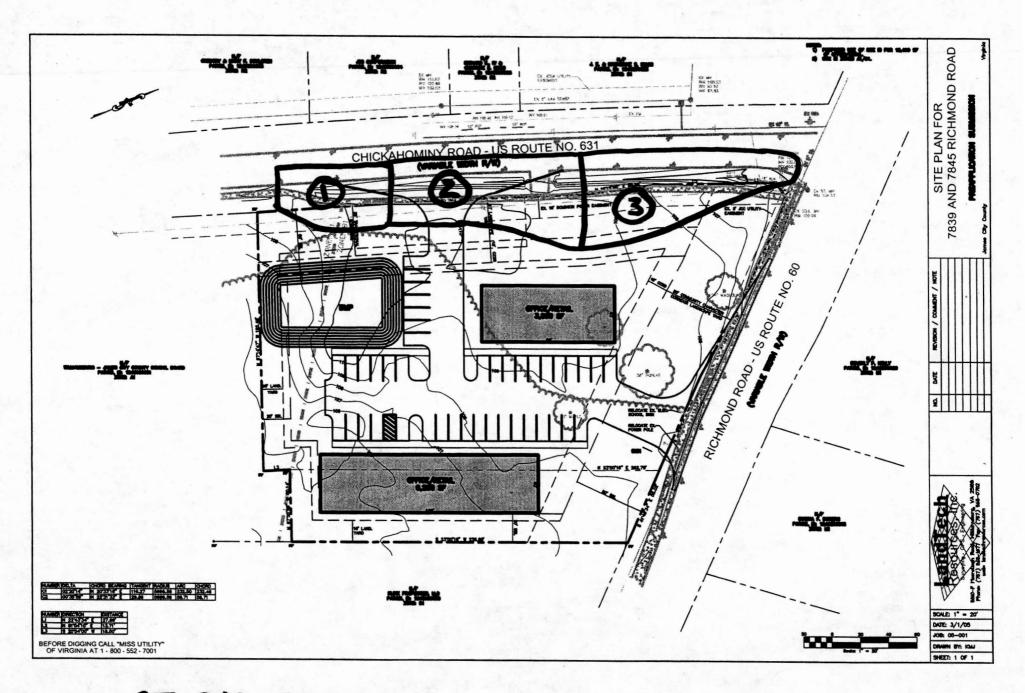
Worksheet for BMP Point System





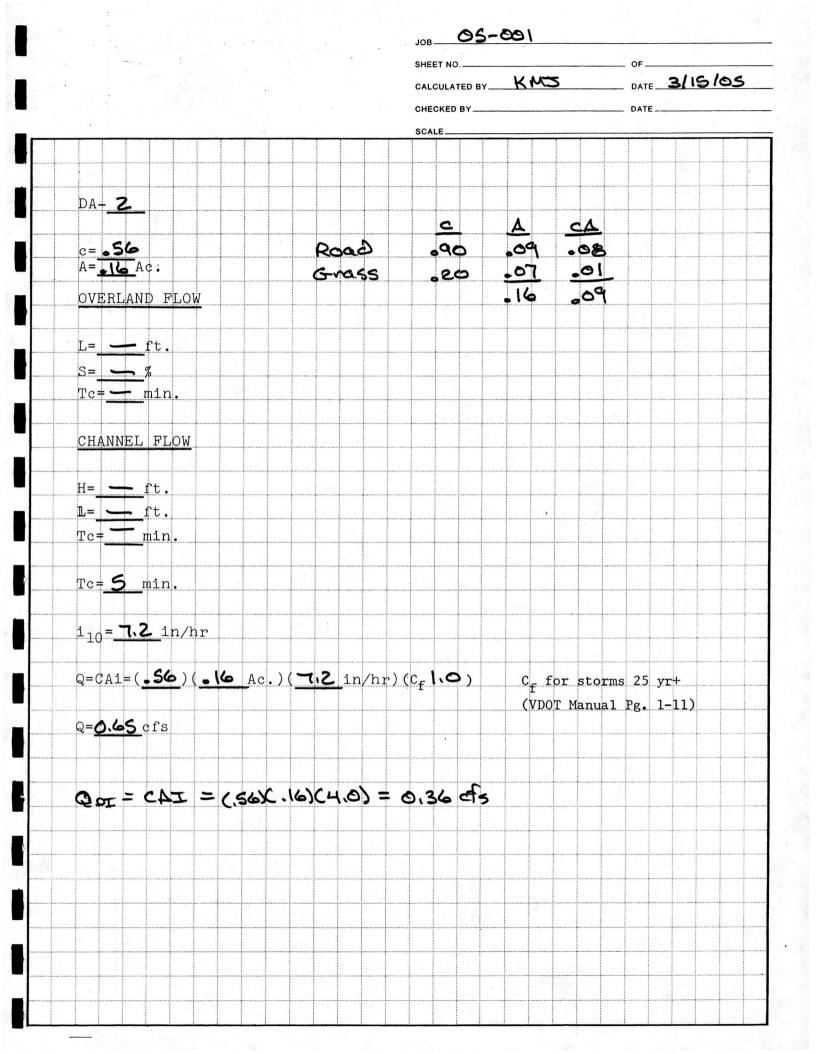
PRE-DEVELOPMENT DRAINAGE AREA

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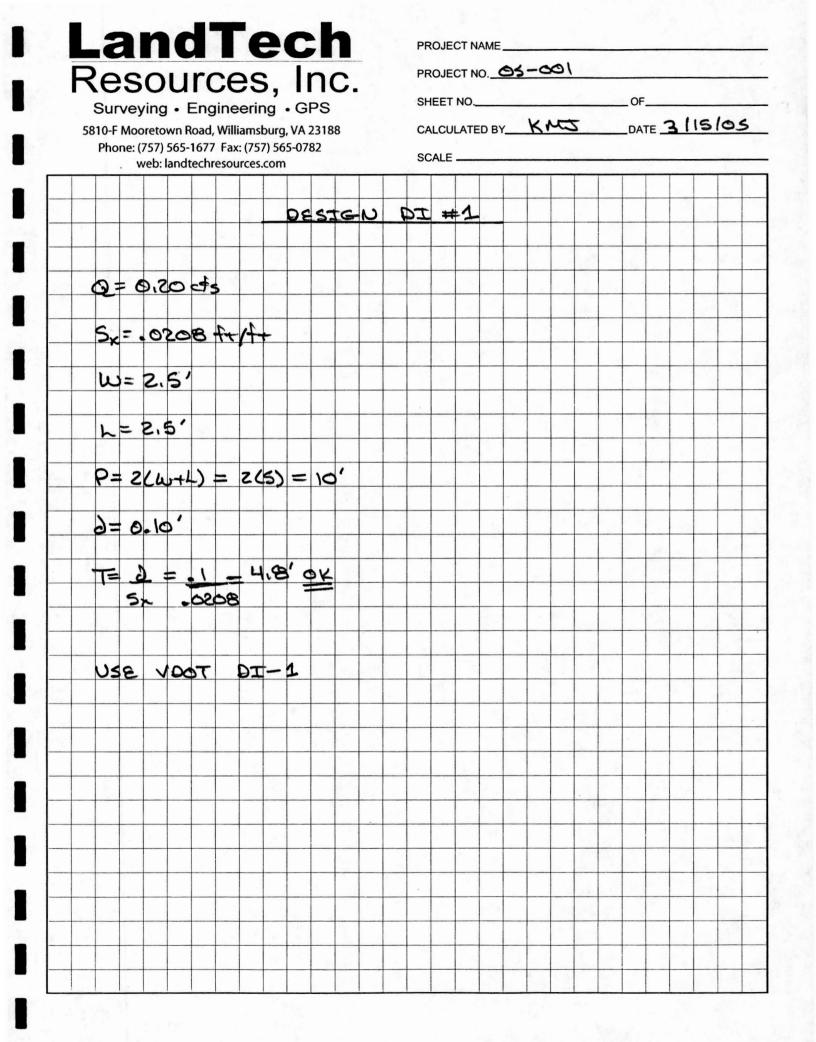


STORM STRUCTURE DRAINAGE AREA MAP

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		SCALE			
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	0	्वठ	A CA 04 .04		
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	Grass	<u>ی</u> کې			
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CHANNEL FLOW					
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L=ft.					
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T a E win					
Tc= <u>5</u> min.					
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			(VDOT Ma	anual Pg. 1-11)	
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LandTech Resources, Inc.

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Storm Drainage Design

Phone: (757) 565-1677 Fax: (757) 565-0782

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0.77

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15

15

0.30%

0.46%

Page 1 of

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0.013

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4.38

Project Manage Kenny Jenkins Project Enginee Kenny Jenkins

For Tc Accumulation, Use VELOCITY (1) from Pipe Slope or (2) V=Q/A : 1 Project Number: 05-001 Project: 7839/7845 Richmond Rd Year Storm: 10 Structure **Pipe Data** Rational Formula: Q = CiA Mannings Formula CA Inlet Time Inverts Runoff, Q Velocity (cfs) (ft/sec) (ft) % (in) T_c (min) (in/hr) Coefficient "C" on pipe on Q/A Capacity (cfs) From V. Incremental Incremental Diameter Cumulative Cumulative Cumulative Incremental Length UPstream Flow Time (min) Slope DOWN-stream Rain Area Based Based (ac) ToFrom CAIn Qinc Length Slope Diamet imelnc Qcun /elocityQ Capacity 2.89 3.55 0.05 0.05 0.29 0.09 0.35 2 5 5.00 0.35 0.30% 1 0.6 6.96 3.74 3.22 172 15

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3

EXMH

0.16

0.18

0.6

0.4

LandTech Resources, Inc.

Hydraulic Grade Line (HGL) Calculations

Project Number: 05-001 Project: 7839/7845 Richmond Rd

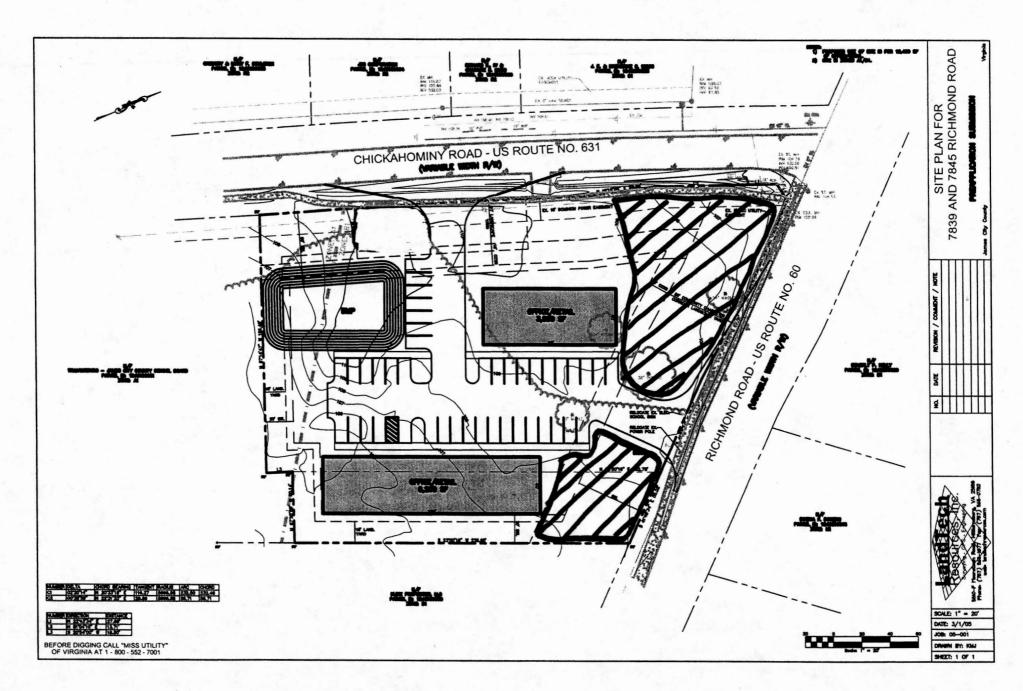
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Page 1 of 1

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SPECIAL STORMWATER CRITERIA MAP

APPENDIX B

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APPENDIX C

Report of Subsurface Investigation and Geotechnical Engineering Services Proposed BMP Facility 7845 Richmond Road James City County, Virginia G E T Project No: WM05-107G March 1, 2005 Prepared For: Mr. Gordon Berryman



March 1, 2005



TO: **Mr. Gordon Berryman** 124 Berkley Lane Williamsburg, Virginia 23185

RE: Report of Subsurface Investigation and Geotechnical Engineering Services **Proposed BMP Facility 7845 Richmond Road** James City County, Virginia **GET** Project No: WM05-107G

Dear Mr. Berryman:

In compliance with your instructions, we have completed our Subsurface Investigation and Geotechnical Engineering Services for the referenced project. The results of this study, together with our recommendations, are presented in this report.

Often, because of design and construction details that occur on a project, questions arise concerning subsurface conditions. **G E T Solutions, Inc.** would be pleased to continue its role as Geotechnical Engineer during the final design phase and project implementation.

We trust that the information contained herein meets your immediate need, and we would ask that you call this office with any questions that you may have.

Respectfully Submitted, **G E T Solutions, Inc.**

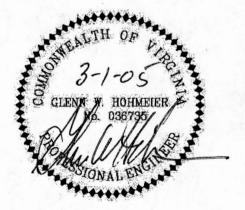
nes Wheeler Project/Geologist

Glenn W. Hohmeier, P.E. Sr. Project Engineer VA Lic. #036735

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Client



Copies:

LandTech Resources (Attn: Mr. Kenny Jenkins)

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APPENDIX III -	GENERALIZED SOIL PROFILE
APPENDIX IV -	INFILTRATION TEST RESULTS



1.0 PROJECT INFORMATION

1.1 **Project Authorization:**

G E T Solutions, Inc. has completed our Geotechnical Engineering study for the proposed BMP facility located at 7845 Richmond Road in James City County, Virginia. The Geotechnical Engineering Services were conducted in accordance with the scope presented in **G E T** proposal No. PWM05-103G. Written authorization to proceed with the Geotechnical Engineering Services was received from Mr. Gordon Berryman.

1.2 **Project Description:**

The construction at this site is planned to consist of two office/retail buildings consisting of having a total floor area of 6,200 ft² per building. Also, new paved driveways and parking areas, BMP facility, along with other pertinent infrastructure components will also be constructed at this site. Our Geotechnical Engineering Services was limited to the construction of the BMP facility.

If any of the noted information is incorrect or has changed, please inform **G E T Solutions**, **Inc.** so that we may amend the recommendations presented in this report, if appropriate.

1.3 Purpose and Scope of Services:

The purpose of this study was to obtain information on the general subsurface conditions at the proposed project site within the BMP area. The subsurface conditions encountered were then evaluated with respect to the available project characteristics. In this regard, engineering assessments for the following items were formulated:

- 1. General assessment of the soils revealed by the borings performed at the proposed development within the BMP area.
- 2. General location and description of potentially deleterious material encountered in the borings that may interfere with construction progress, including existing fills or surficial/subsurface organics.
- 3. Evaluation of the permeability of the soils within the BMP area by means of performing in-situ infiltration tests.
- 4. Providing engineering recommendations with respect to BMP related construction parameters, including estimates of shallow subsurface soil permeability characteristics.



The scope of services did not include an environmental assessment for determining the presence or absence of wetlands or hazardous or toxic material in the soil, bedrock, surface water, groundwater or air, on or below or around this site. Prior to development of this site, an environmental assessment is advisable.

2.0 FIELD AND LABORATORY PROCEDURES

2.1 Field Exploration:

In order to explore the general subsurface soil types and to aid in developing associated design parameters, three (3) 10-foot deep hand auger borings (designated as HA-1, HA-2 and HA-3) were performed by **G E T Solutions, Inc.** within the proposed BMP area. In addition, three infiltration tests (designated as INF-1, INF-2 and INF-3) were performed within the hand auger borings at various depths.

The boring locations were established, located and staked in the field by a representative of **G E T Solutions, Inc.** The approximate boring locations are shown on the "Boring Location Plan" (Figure 1) attached to this report (Appendix I).

2.2 Laboratory Testing:

Representative portions of all soil samples collected at the hand auger locations were sealed in plastic bags, labeled and transferred to our laboratory for classification and analysis. The soil classification was performed by a Geotechnical Engineer in accordance with ASTM D 2488.

Three representative soil samples were selected and subjected to laboratory testing, which included natural moisture and -#200 sieve wash, in order to corroborate the visual classification. These test results are noted in Table I and are presented on the "Log of Boring" sheet (Appendix II), included with this report.



Table I – Laboratory Test Results

Boring No.	Depth (Ft)	Natural Moisture (%)	-#200 Sieve (%)	Atterberg Limits (LL/PL/PI)	Classification
HA-1/INF-1*	2-3	18.5	39.3	NOT TESTED	SM-SC
HA-2/INF-2*	3-4	20.2	49.1	25/15/10	SC
HA-3/INF-3*	6.5-7.5	13.8	14.7	NON PLASTIC	SM

*Sample obtained from the infiltration test depth.

3.0 SITE AND SUBSURFACE CONDITIONS

3.1 Site Location and Description:

The project site is located at 7845 Richmond Road in James City County, Virginia. Currently, the site is an undeveloped, wooded area that is relatively level with grades ranging from 106 to 110 feet across the project site.

3.2 Subsurface Soil Conditions:

The results of our field exploration program indicated the presence of approximately 6 inches of topsoil material at the boring locations. The topsoil thickness could vary across the site. Underlying the topsoil and extending to the boring termination depth of 10 feet below existing grades, the subsurface soils were generally arranged in a 1-layer configuration.

The initial soil layer extended from beneath the topsoil material to boring termination of 10 feet. The recovered soils were generally granular in nature and were comprised of SAND (SP-SM, SM, SM-SC, SC), with varying amounts of Silt and Clay. As an exception, a cohesive layer comprised of Sandy CLAY (CL) was encountered at boring location HA-3 from a depth of 8 to 10 feet (boring termination depth).

The subsurface description is of a generalized nature provided to highlight the major soil strata encountered. The records of the subsurface exploration included in Appendix II (Log of Boring sheets) and in the Generalized Soil Profile presented in Appendix III, which should be reviewed for specific information as to the individual borings. The stratifications shown on the records of the subsurface exploration represent the conditions only at the actual boring locations. Variations may occur and should be expected between boring locations. The stratifications represent the approximate boundary between subsurface materials and the transition may be gradual.



3.3 Groundwater Information:

The groundwater table depth was not encountered during our field exploration to the depth explored (10 feet below existing grades).

Groundwater conditions will vary with environmental variations and seasonal conditions, such as the frequency and magnitude of rainfall patterns, as well as man-made influences, such as existing swales, drainage ponds, underdrains and areas of covered soil (paved parking lots, side walks, etc.). It is estimated normal seasonal high groundwater level will fluctuate within 2 feet of the current levels. We recommend that the contractor determine the actual groundwater levels at the time of the construction to determine groundwater impact on this project.

4.0 EVALUATION AND RECOMMENDATIONS

4.1 Infiltration Testing

Three infiltration tests (INF-1, INF-2 and INF-3) were performed within the lateral limits of the proposed BMP facility, corresponding to boring location HA-1, HA-2 and HA-3. Specifically, infiltration test INF-1 was performed at a depth of 2 to 3 feet below existing grades within hand auger boring HA-1, while infiltration test INF-2 was performed at a depth of 3 to 4 feet below existing grades within hand auger boring HA-2, and infiltration test INF-3 was performed at a depth of 6.5 to 7.5 feet below existing grades within hand auger boring HA-3. The infiltration test borehole was prepared utilizing a planer auger to remove soil clippings from its base (test levels ranged from 2 to 7.5 below the ground surface). Infiltration testing was then conducted within the vadose zone utilizing a Precision Permeameter and the following testing procedures.

A support stand was assembled and placed adjacent to the borehole. This stand holds a calibrated reservoir (2000 ml) and a cable used to raise and lower the water control unit (WCU). The WCU establishes a constant water head within the borehole during testing by use of a precision valve and float assembly. The WCU was attached to the flow reservoir with a 2-meter (6.6 foot) braided PVC hose and then lowered by cable into the borehole to the test depth elevation. As required by the Glover solution, the WCU was suspended 6 – inches above the bottom of the borehole. The shut-off valve was then opened allowing water to pass through the WCU to fill the borehole to the constant water level elevation. The absorption rate slowed as the soil voids became filled and an equilibrium developed as a wetting bulb developed around the borehole. Water was continuously added until the flow rate stabilized. The reservoir was then re-filled in order to begin testing. During testing, as the water drained into the borehole and surrounding soils, the water level within the calibrated reservoir was recorded as well as the elapsed time during each interval. The test was continued until relatively consistent flow rates were documented. During testing.



Solutions, Inc.

the quick release connections and shutoff valve were monitored to ensure that no leakage occurred. The flow rate (Q), height of the constant water level (H), and borehole diameter (D) were used to calculate K_s utilizing the Glover Solution.

Based on the field testing and corroborated with laboratory testing results (published values compared to classification results), the hydraulic conductivity of the shallow soils at the tested depths (ranging from 2 to 7.5 feet) as identified at the location of the infiltration tests ranged from $k = 4.46 \times 10^{-5}$ cm/sec (or 0.063 in /hour) to $k = 1.38 \times 10^{-3}$ cm/sec (or 1.951 in/hour). The following provides the infiltration test results corresponding to the specific locations and depths.

Infiltration Test	Boring Location	Depth Test Conducted (ft)	Percent Fines	Hyrdraulic Conductivity (cm/sec)
INF-1	HA-1	1.5-2.5	39.3	7.09 x 10 ⁻⁵
INF-2	HA-2	3-4	39.5	4.46 x 10 ⁻⁵
INF-3	HA-3	6-7	14.7	1.38 x 10 ⁻³

Table 2 – Infiltration Test Results

4.2 Engineering Evaluation for BMP Area

Based on the results of our field and laboratory testing procedures and engineering analysis, the following observations, opinions, and recommendations are presented:

Seepage:

- ✓ The subsurface soils at the boring locations were primarily granular in nature and comprised of of SAND (SP-SM, SM, SM-SC, SC) with varying amounts of Silt and CLAY extending to boring termination depth of 10 feet below existing grades, with the exception of HA-3 consisting of Sandy CLAY (CL) at a depth of 8 to 10 feet. As such, and based on infiltration test results, the hydraulic conductivity values are anticipated to range between high and moderately low Ksat Class (on the order of 1.0 x 10⁻³ cm/sec to 1.0 x 10⁻⁵ cm/sec, respectively). Applicable safety factor should be applied for design purposes.
- The groundwater table was not encountered to the depth explored (10 feet below existing grades) during our field exploration.



Borrow Material:

✓ On the basis of the results of our soil test borings and laboratory testing procedures, the soils encountered to boring termination depth of 10 feet within the boring performed, were generally granular in nature. Some of the on-site granular soils (SP-SM, SM) encountered during our field exploration may be considered suitable for re-use as structural fill. However, in order to verify the acceptance or rejection of the existing soils for re-use as structural fill, additional classification tests (natural moisture and -#200 sieve) will have to be performed during construction [Suitable structural fill material should consist of sand or gravel containing less than 20% by weight of fines (SP, SM, SW, GP, GW), having a liquid limit less than 20 and plastic limit less than 6, and should be free of rubble, organics, clay, debris and other unsuitable material].

5.0 CONSTRUCTION CONSIDERATIONS

5.1 Drainage and Groundwater Concerns:

It is expected that dewatering will be required for excavations that extend near or below the groundwater level. We recommend that the contractor determine the actual groundwater levels at the time of the construction to determine groundwater impact on this project.

It would be advantageous to construct all fills early in the construction. If this is not accomplished, disturbance of the existing site drainage could result in collection of surface water in some areas, thus rendering these areas wet and very loose. Temporary drainage ditches should be employed by the contractor to accentuate drainage during construction.

5.2 Excavations:

In Federal Register, Volume 54, No. 209 (October, 1989), the United States Department of Labor, Occupational Safety and Health Administration (OSHA) amended its "Construction Standards for Excavations, 29 CFR, part 1926, Subpart P". This document was issued to better insure the safety of workmen entering trenches or excavations. It is mandated by this federal regulation that all excavations, whether they be utility trenches, basement excavation or footing excavations, be constructed in accordance with the new (OSHA) guidelines. It is our understanding that these regulations are being strictly enforced and if they are not closely followed, the owner and the contractor could be liable for substantial penalties.



The contractor is solely responsible for designing and constructing stable, temporary excavations and should shore, slope, or bench the sides of the excavations as required to maintain stability of both the excavation sides and bottom. The contractor's responsible person, as defined in 29 CFR Part 1926, should evaluate the soil exposed in the excavations as part of the contractor's safety procedures. In no case should slope height, slope inclination, or excavation depth, including utility trench excavation depth, exceed those specified in local, state, and federal safety regulations.

We are providing this information solely as a service to our client. **GET Solutions, Inc.** is not assuming responsibility for construction site safety or the contractor's activities; such responsibility is not being implied and should not be inferred.

6.0 <u>REPORT LIMITATIONS</u>

The recommendations submitted are based on the available soil information obtained by **G E T Solutions, Inc.** and the information supplied by Mr. Gordon Berryman, and his consultants for the proposed project. If there are any revisions to the plans for this project or if deviations from the subsurface conditions noted in this report are encountered during construction, **G E T Solutions, Inc.** should be notified immediately to determine if changes in the foundation recommendations are required. If **G E T Solutions, Inc.** is not retained to perform these functions, **G E T Solutions, Inc.** can not be responsible for the impact of those conditions on the geotechnical recommendations for the project.

The Geotechnical Engineer warrants that the findings, recommendations, specifications or professional advice contained herein have been made in accordance with generally accepted professional geotechnical engineering practices in the local area. No other warranties are implied or expressed.

After the plans and specifications are more complete the Geotechnical Engineer should be provided the opportunity to review the final design plans and specifications to assure our engineering recommendations have been properly incorporated into the design documents, in order that the earthwork and foundation recommendations may be properly interpreted and implemented. At that time, it may be necessary to submit supplementary recommendations. This report has been prepared for the exclusive use of Mr. Gordon Berryman and his consultants for the specific application to the proposed BMP facility located at 7845 Richmond Road in James City County, Virginia.



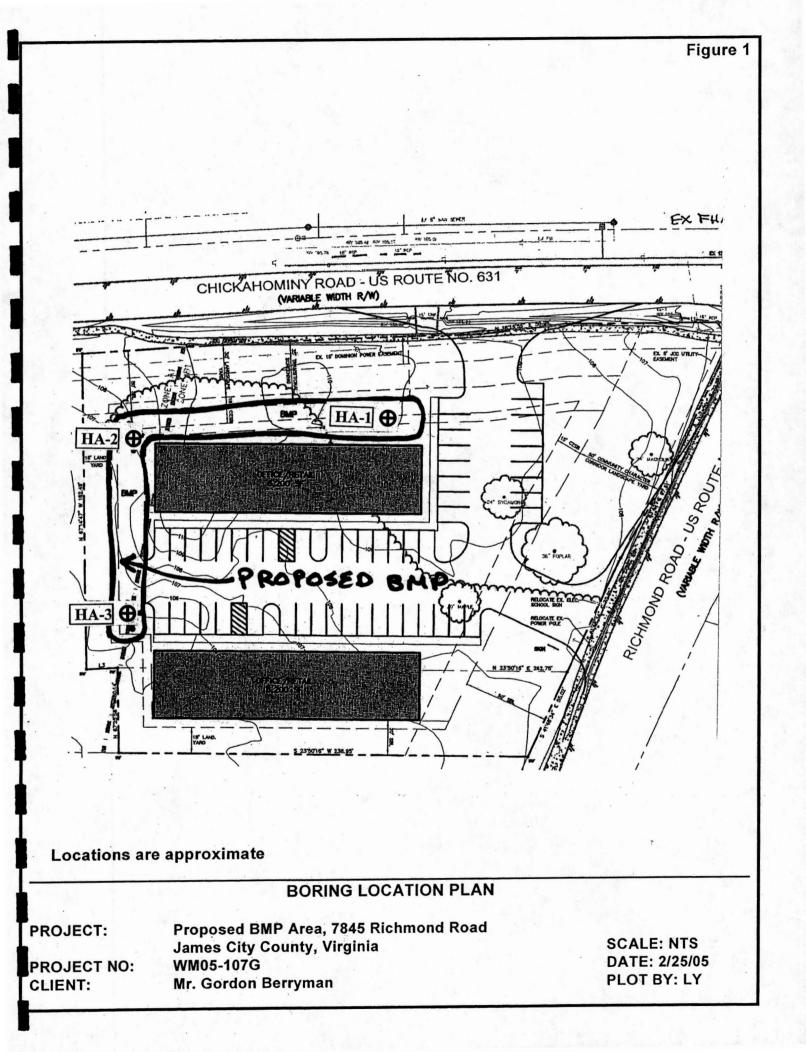
APPENDICES

- I. BORING LOCATION PLAN
- II. LOG OF BORINGS

- III. GENERALIZED SOIL PROFILE
- IV. INFILTRATION TEST RESULTS

APPENDIX I -

BORING LOCATION PLAN



APPENDIX II -

LOG OF BORINGS

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	Borii	ng terminated at 10 ft.					· · · · · · · · · · · · · · · · · · ·					
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-	Tan, moist, Silty, fine to medium SAND (SM)					15	•						
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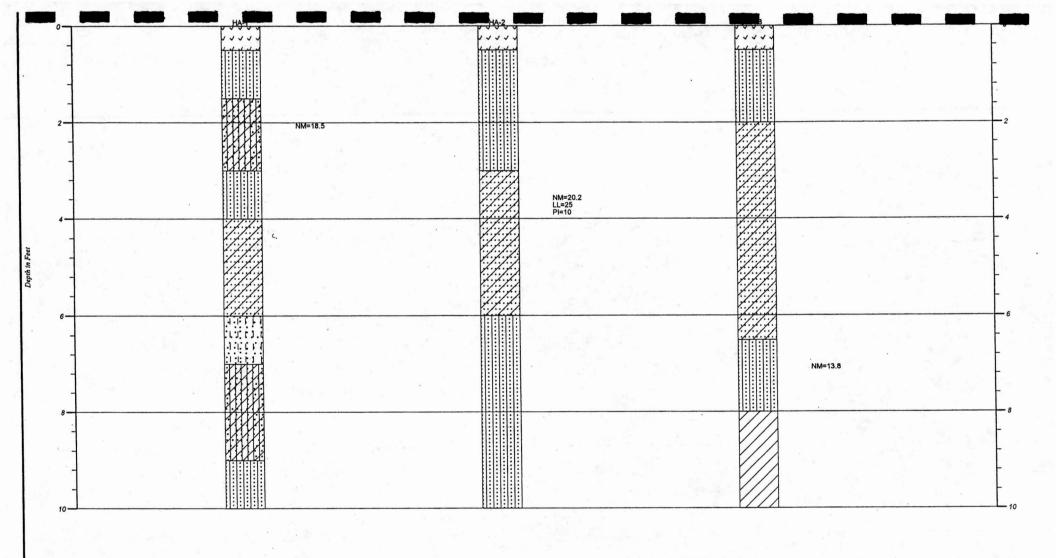
Figure

APPENDIX III -

I

I

GENERALIZED SOIL PROFILE



Strata symbols	Low plasticity clay	
Topsoil		GET Solutions, Inc.
Silty sand		GENERALIZED SOIL PROFILE
Poorly graded clayey silty sand		HORIZONITAL SCALE: DRAWN BY/APPROVED BY DATE DRAWN VERTICAL SCALE: 1*-2' S Peterson 2/25/2005
Clayey sand		Proposed BMP Area, 7845 Richmond Road James City County, Virginia
With silt		PROJECT NO. WM05-107G

APPENDIX IV -

I

INFILTRATION TEST RESULTS

GET S	SOLUTIONS,	INC.	SATUR	ATED HYDRAU	JLIC CONDUC		ORKSHEE	г _з	heet No.:					
Project Name.:	7845 Richmond R	d.	Location	Proposed BMP Fac	ility		Termin	ology and So	ution					
Boring No:	INF-1 at HA-1		Date	2/25/2005		Ksat: Satu	Ksat : Saturated hydraulic conductivity							
Investigators.:	J. Wheeler		File Name:	WM05-107G	Stand and	Q: Steady-state rate of water flow into the soil								
Boring Depth.:	30 inches	6.	WCU Base. Ht. h: 15.0 cm H				H: Constant height of water in borehole							
Boring Dia:	8.3	cm	WCU Susp. Ht. S: 15.2 cm r			r: Radi	us of cylindric	al borehole						
Boring Rad. (r):	4.15	cm	Const. Wtr. Ht. H: 30.2 cm K			Ksat = Q[sint	n-1(H/r) - (r2/H2	2+1).5 + r/H] / (2	pH2) [Glove	r Solution]				
VOLUME (ml)	Volume Out (ml) [a]	TIME (hr:min:sec a/p)	Elapsed (hr:min:sec)	I Time (min) [b]	Flow Rate Q (ml/min) [a/b]	(cm/min)	Ksat (cm/sec)	Equivalent Va (cm/day)	alues	(ft/day)				
2000		11:00:00 AM	C POPOLO DE MON DE L'INCORDO DE DE DE LE VIDIO DE L'ANTRE DE LA DESERVACIÓN DE LA DESERVACIÓN DE LA DESERVACIÓN				(cill/sec)	(cni/day)		(IUday)				
1990	10	11:00:36 AM	the event of the second s	0.60	16.67	0.005	8.78E-05	7.6	0.124	0.25				
1980	10	11:01:13 AM		0.62	16.22	0.005	8.54E-05	7.4	0.121	0.24				
1970	10	11:01:56 AM		0.72	13.95	0.004	7.35E-05	6.3	0.104	0.21				
1960	10	11:02:42 AM	0:00:46	0.77	13.04	0.004	6.87E-05	5.9	0.097	0.19				
1950	10	11:03:28 AM	0:00:46	0.77	13.04	0.004	6.87E-05	5.9	0.097	0.19				
1940	10	11:04:15 AM	0:00:47	0.78	12.77	0.004	6.72E-05	5.8	0.095	0.19				
1930	10	11:05:00 AM	0:00:45	0.75	13.33	0.004	7.02E-05	6.1	0.100	0.20				
1920	10	11:05:48 AM	0:00:48	0.80	12.50	0.004	6.58E-05	5.7	0.093	0.19				
1910	10	11:06:35 AM	0:00:47	0.78	12.77	0.004	6.72E-05	5.8	0.095	0.19				
1900	10	11:07:22 AM	0:00:47	0.78	12.77	0.004	6.72E-05	5.8	0.095	0.19				
1890	10	11:08:10 AM	0:00:48	0.80	12.50	0.004	6.58E-05	5.7	0.093	0.19				
1880		11:08:57 AM	and the second s	0.78	12.77	0.004	6.72E-05	5.8	0.095	0.19				
1870		11:09:42 AM		0.75	13.33	0.004	7.02E-05	6.1	0.100	0.20				
1860		11:10:29 AM	And the second sec	0.78	12.77	0.004			0.095	0.19				
Natural Moisture:	and a second s	Init. Satur.Time:			ED FIELD KSAT:	0.004			0.100	0.20				
Texture/Classif: Structure/Fabric:	SAND (SM-SC)	Consistency: Slope/Landsc:	Medium Dense slope	Depth to an Imper Depth to Bedrock		N/A N/A	Notes:	Ksat Class =	woderately L	OW				
ksatReport1.xls		Siope/Landsc:	31046	Precision Perm			Y Y			Rev. 4/5/002				

GET S	SOLUTIONS,	INC.	SATUF	ATED HYDRAU	JLIC CONDUC	TIVITY WO	ORKSHEET	г _з	Sheet No.: 2	:				
Project Name.:	7845 Richmond R	d.	Location	Proposed BMP Fac	ility		Termin	ology and So	lution					
Boring No:	INF-2 at HA-2		Date:	2/5/2005		Ksat: Satu	: Saturated hydraulic conductivity							
Investigators.:	J. Wheeler		File Name:	WM05-107G	Sec. 1	Q: Steady-state rate of water flow into the soil								
Boring Depth.:	42 inches		WCU Base. Ht. h: 15.0 cm				H: Constant height of water in borehole							
Boring Dia:	8.3	cm	WCU Susp. Ht. S: 15.2 cm				us of cylindric	al borehole						
Boring Rad. (r):	4.15	cm				Ksat = Q[sinl	n-1(H/r) - (r2/H2	2+1).5 + r/H] / (2	pH2) [Glover	Solution]				
VOLUME	Volume Out	TIME	Elapsed	and the second se	Flow Rate Q		Ksat	Equivalent Va	and the second se	and the second se				
<u>(ml)</u>	(ml) [a]	(hr:min:sec a/p)	(hr:min:sec)	(min) [b]	(ml/min) [a/b]	(cm/min)	(cm/sec)	(cm/day)	(in/hr)	(ft/day)				
2000		1:00:00 PM	and the second second											
1990	10	1:01:13 PM	0:01:13	1.22	8.22	0.003	4.33E-05	3.7	0.061	0.12				
1980	10	1:02:19 PM	0:01:06	1.10	9.09	0.003	4.79E-05	4.1	0.068	0.14				
1970	10	1:03:26 PM	0:01:07	1.12	8.96	0.003	4.72E-05	4.1	0.067	0.13				
1960	10	1:04:36 PM	0:01:10	1.17	8.57	0.003	4.51E-05	3.9	0.064	0.13				
1950	10	1:05:45 PM	0:01:09	1.15	8.70	0.003	4.58E-05	4.0	0.065	0.13				
1940	10	1:06:58 PM	0:01:13	1.22	8.22	0.003	4.33E-05	3.7	0.061	0.12				
1930	10	1:08:09 PM	0:01:11	1.18	8.45	0.003	4.45E-05	3.8	0.063	0.13				
1920	. 10	1:09:20 PM	0:01:11	1.18	8.45	0.003	4.45E-05	3.8	0.063	0.13				
1910	10	1:10:35 PM	0:01:15	1.25	8.00	0.003	4.21E-05	3.6	0.060	0.12				
1900	10	1:11:44 PM	0:01:09	1.15	8.70	0.003	4.58E-05	4.0	0.065	0.13				
1890	10	1:12:54 PM	0:01:10	1.17	8.57	0.003	4.51E-05	3.9	0.064	0.13				
1880	10	1:14:11 PM	0:01:17	1.28	7.79	0.002	4.10E-05	3.5	0.058	0.12				
Natural Moisture:	Moist	Init. Satur.Time:	12:45:00 AM	ESTIMAT	ED FIELD KSAT:	0.003	4.46E-05		0.063	0.13				
Texture/Classif:	SAND (SC)	Consistency:	Medium Dense	Depth to an Impe		N/A	Notes:	Ksat Class =	Moderately Lo	WC				
Structure/Fabric:	N/A	Slope/Landsc:	slope	Depth to Bedrock	······	N/A								
ksatReport1.xls				Precision Perm	neameter tm					Rev. 4/5/002				

GET S	SOLUTIONS,	INC.	SATUR	RATED HYDRAU	JLIC CONDUC	TIVITY WO	ORKSHEE	r s	heet No.: 3	3				
Project Name.:	7845 Richmond R	Rd.	Location	Proposed BMP Fac	ility		Terminology and Solution							
Boring No:	INF-3 at HA-3		Date:	2/5/2005		Ksat : Saturated hydraulic conductivity								
nvestigators .:	J. Wheeler		File Name:	WM05-107G	3 - F	Q: Steady-state rate of water flow into the soil								
Boring Depth.:	84 inches		WCU Base. Ht. h: 15.0 cm				H: Constant height of water in borehole							
Boring Dia:	8.3	cm	WCU Susp. Ht. S: 15.2 cm r			r: Radius of cylindrical borehole								
Boring Rad. (r):	4.15	cm	Солят. Wtr. Ht. H: 30.2 cm к			Ksat = Q[sin]	n-1(H/r) - (r2/H2	2+1).5 + r/H] / (2)	H2) [Glove	r Solution]				
VOLUME (ml)	Volume Out (ml) [a]	TIME (hr:min:sec a/p)	Elapsed (hr:min:sec)	I Time (min) [b]	Flow Rate Q (ml/min) [a/b]	(cm/min)	(cm/sec)	Equivalent Va (cm/day)	lues (in/hr)	(ft/day)				
2000		2:00:00 PM	A STATE OF A											
1950	50	2:00:12 PM	0:00:12	0.20	250.00	0.079	1.32E-03	113.7	1.866	3.73				
1900	50	2:00:23 PM	0:00:11	0.18	272.73	0.086	1.44E-03	124.1	2.035	4.07				
1850	50	2:00:34 PM	0:00:11	0.18	272.73	0.086	1.44E-03	124.1	2.035	4.07				
1800	50	2:00:45 PM	0:00:11	0.18	272.73	0.086	1.44E-03	124.1	2.035	4.07				
1750	50	2:00:56 PM	0:00:11	0.18	272.73	0.086	1.44E-03	124.1	2.035	4.07				
1700	50	2:01:07 PM	0:00:11	0.18	272.73	0.086	1.44E-03	124.1	2.035	4.07				
1650	50	2:01:18 PM	0:00:11	0.18	272.73	0.086	1.44E-03	124.1	2.035	4.0				
1600	50	2:01:30 PM	0:00:12	0.20	250.00	0.079	1.32E-03	113.7	1.866	3.73				
1550	50	2:01:42 PM	0:00:12	0.20	250.00	0.079	1.32E-03	113.7	1.866	3.73				
1500	50	2:01:54 PM	0:00:12	0.20	250.00	0.079	1.32E-03	113.7	1.866	3.73				
1450	50	2:02:06 PM	0:00:12	0.20	250.00	0.079	1.32E-03	113.7	1.866	3.73				
1400	50	2:02:18 PM	0:00:12	0.20	250.00	0.079	1.32E-03	113.7	1.866	3.73				
1350	50	2:02:30 PM	0:00:12	0.20	250.00	0.079	1.32E-03	113.7	1.866	3.7				
1300	50	and the second state of th		and the second se	250.00	the second se	and the second se		1.866	3.7				
Natural Moisture:	the second state of the se	Init. Satur.Time:		and the second sec	ED FIELD KSAT:	0.083			1.951	3.9				
and the second sec	SAND (SM)	Consistency:	Medium Dense	Depth to an Imper	and the second se	in the second	Notes:	Ksat Class = I	High					
Structure/Fabric: ksatReport1.xls	N/A	Slope/Landsc:	slope	Depth to Bedrock Precision Perm		N/A								

Report of Subsurface Exploration and Geotechnical Engineering Services Proposed BMP Facility 7845 Richmond Road James City County, Virginia G E T Project No: WM05-107G May 26, 2005 Prepared For: Mr. Gordon Berryman



Geotechnical · Environmental · Testing

May 26, 2005



TO: **Mr. Gordon Berryman** 124 Berkley Lane Williamsburg, Virginia 23185

RE: Addendum No. 1 Report of Subsurface Exploration and Geotechnical Engineering Services **Proposed BMP Facility 7845 Richmond Road** James City County, Virginia **G E T** Project No. WM05-107G

Dear Mr. Berryman:

The following is an addendum to our original Geotechnical Report (GET Project No. WM05-107G, dated March 1, 2005). In compliance with your instructions, we have performed additional testing services within the proposed relocated BMP limits. These services have been requested due to the revisions in the BMP location and size. Also, the proposed elevation of the bottom of the BMP facility, which will be at an elevation of 101 feet has now been provided. Based on this information and the topography plan provided, **G E T Solutions, Inc.** has performed infiltration testing within the soils expected to be within the bottom of the BMP facility to a depth of 3 feet below the bottom of the BMP facility, as required by James City County.

Field Exploration:

Our additional services included advancing six (3) hand auger borings to depths ranging from 10 to 12 feet below existing grades (designated as HA-4 through HA-6) and performing three (3) associated infiltration tests within the lateral limits of the proposed relocated BMP facility in order to evaluate the permeability of the on-site soils.

Subsurface Soil Conditions:

The results of our field exploration program indicated the presence of about 6 inches of topsoil. The topsoil thickness could vary between boring locations. Underlying the topsoil materials, the natural subsurface soils generally consisted of granular soils, which were comprised of SAND (SC, SM, SM-SC) with varying amounts of Silt and Clay. As an exception, CLAY (CL) with varying amounts of Sand was encountered at boring location HA-6 at a depth of 5 to 6 feet and 7 to 12 feet and Sandy SILT (ML) was encountered at boring location is of a generalized nature provided to highlight the major soil strata encountered. The records of the subsurface exploration are included in Appendix II (Log of Boring sheets) and in the Generalized Soil Profile presented in Appendix III, which should be reviewed for specific information as to the individual borings. The stratifications shown on the records of the subsurface exploration represent the conditions only at the actual boring locations. Variations may occur and should be expected between boring locations. The stratifications may be gradual.

Groundwater Information:

The groundwater table was not encountered within the hand auger borings to the depths explored. Groundwater conditions will vary with environmental variations and seasonal conditions, such as the frequency and magnitude of rainfall patterns, as well as man-made influences, such as existing swales, drainage ponds, underdrains and areas of covered soil (paved parking lots, side walks, etc.). It is estimated normal seasonal high groundwater level will fluctuate within 2 to 3 feet above the current (unexplored) levels. We recommend that the contractor determine the actual groundwater levels at the time of the construction to determine groundwater impact on this project.

Infiltration Testing:

Three infiltration tests (INF-4 through INF-6) were performed within the lateral limits of the proposed BMP area, corresponding to boring locations HA-4 through HA-6. The infiltration test boreholes were prepared utilizing a planer auger to remove soil clippings from its base (test levels ranging from 0.5 to 6.5 feet below the existing ground surface). Infiltration testing was then conducted within the vadose zone utilizing a Precision Permeameter and the following testing procedures. Specifically, two of the infiltration tests (INF-4, and INF-5) were performed within the Silty SAND (SM) layer, and one of the infiltration test (INF-6) was performed within the CLAY (CL) with some Sand.



A support stand was assembled and placed adjacent to the borehole. This stand holds a calibrated reservoir (2000 ml) and a cable used to raise and lower the water control unit (WCU). The WCU establishes a constant water head within the borehole during testing by use of a precision valve and float assembly. The WCU was attached to the flow reservoir with a 2-meter (6.6 foot) braided PVC hose and then lowered by cable into the borehole to the test depth elevation. As required by the Glover solution, the WCU was suspended above the bottom of the borehole at an elevation of approximately 5 times the borehole diameter. The shut-off valve was then opened allowing water to pass through the WCU to fill the borehole to the constant water level elevation. The absorption rate slowed as the soil voids became filled and an equilibrium developed as a wetting bulb developed around the borehole. Water was continuously added until the flow rate stabilized. The reservoir was then re-filled in order to begin testing. During testing, as the water drained into the borehole and surrounding soils, the water level within the calibrated reservoir was recorded as well as the elapsed time during each interval. The test was continued until relatively consistent flow rates were documented. During testing the quick release connections and shutoff valve were monitored to ensure that no leakage occurred. The flow rate (Q), height of the constant water level (H), and borehole diameter (D) were used to calculate Ks utilizing the Glover Solution.

Based on the field testing and corroborated with laboratory testing results (published values compared to classification results), the hydraulic conductivity of the shallow soils at the various depths and locations as identified at the location of the infiltration tests averaged 7.08×10^{-4} cm/sec (or 1.00 in/hour) within the Silty SAND (SM) soils and 8.01 x 10^{-6} cm/sec (or 0.011 in/hour) within the CLAY (CL) with some Sand. The individual infiltration test results and depths are provided within the table below.

Infiltration Test	Test Depth (feet)	-#200 Sieve (%)	Atterberg Limits (LL/PL/PI)	Classification	Hydraulic Conductivity (cm/sec)
INF-4	8-9	30.6	Non Plastic	SM	8.93 x 10 ⁻⁴ cm/sec
INF-5	9-10	37.9	Non Plastic	SM	5.23 x 10 ⁻⁴ cm/sec
INF-6	11-12	76.5	Not Tested	CL	8.01 x 10 ⁻⁶ cm/sec

Table 1 – Infiltration Test Results



Engineering Evaluation for BMP Areas:

Based on the results of our field and laboratory testing procedures and engineering analysis, the following observations, opinions, and recommendations are presented:

Seepage:

✓ The soils encountered within the zone of infiltration (from bottom of BMP basin to 3 feet below bottom of BMP basin) at the BMP boring locations primarily consisted of granular and cohesive soils. The granular soils were comprised of Silty SAND (SM) and the cohesive soils comprised of CLAY (CL) with some sand. As such, and based on the laboratory gradation test and infiltration test results, the hydraulic conductivity values within the granular soils are anticipated to be moderately high Ksat Class (ranging from 1.0×10^{-3} cm/sec to 1.0×10^{-4} cm/sec), while the hydraulic conductivity values within the cohesive soils are anticipated to be low Ksat Class (ranging from 1.0×10^{-6} cm/sec to 1.0×10^{-7} cm/sec). Applicable safety factors should be applied for design purposes.

Borrow Material:

✓ On the basis of the results of our soils test boring and laboratory testing procedures, the soils encountered generally consisted beneath of SAND (SC, SM, SM-SC) with varying amounts of Clay with some deposits of CLAY (CL) and Sandy SILT (ML) with varying amounts of Sand at the BMP boring locations. The CLAY (CL) and Clayey SAND (SC) soils encountered were not considered suitable for re-use as structural fill, but may be used as general fill within "green" areas. The CLAY (CL) soils encountered may potentially be used for construction of the dam associated with the BMP facility, if applicable. The Silty SAND (SM) soils encountered may be considered suitable for re-use as structural fill. However, in order to verify the acceptance or rejection of the existing soils for re-use as structural fill or dam fill (if applicable), additional classification tests (natural moisture and -#200 sieve) will have to be performed during construction. All unsuitable soils, if so deemed, may be re-used as fill within "green" areas.

All other recommendations provided in the original Geotechnical Report remain valid. It is recommended to permanently attach this addendum to the original Geotechnical Report.



We trust that the information contained herein meets your immediate need, and we would ask that you call this office with any questions that you may have.

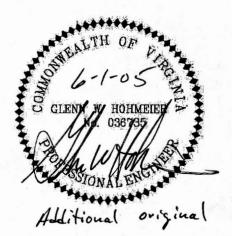
Respectfully Submitted, **G E T Solutions, Inc.**

In James R. Wheeler

Project/Geologist

Copies:

Glenn W. Hohmeier, P.E. Senior Project Engineer VA Lic. # 36735



(2) Client

(1) LandTech Resources (Attn: Mr. Kenny Jenkins)

Attachments: Boring Location Plan Log of Borings Generalized Subsurface Profile Infiltration Test Results



BORING LOCATION PLAN

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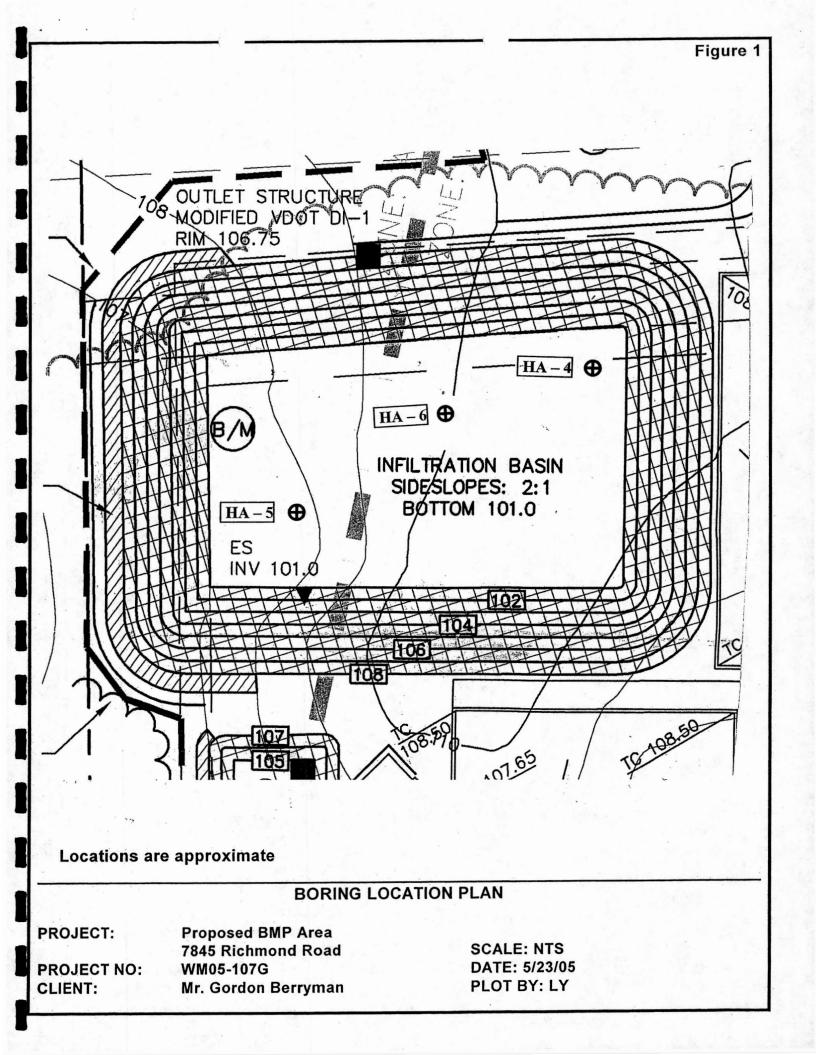
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LOG OF BORINGS

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		. JJECT: Proposed BMP Area, 7845 Richm	nond Ro	ao				PROJECT NO.: WM	05-107G
	Geotechnical	CLIENT: Mr. Gordon Berryman		-					
	Envirtumental	PROJECT LOCATION: James City County,	Virgini	a					
	utions, Inc.	LOCATION: See Attached Boring Location P			1.000			ELEVATION: 110	
lic	OG OF BORING	DRILLER: GET Solutions, Inc.			-			LOGGED BY: LY	loung
		DRILLING METHOD: Hand Auger						DATE: 0	
	No. HA-4	DEPTH TO - WATER> INITIAL: ₩	AF	TER 24	HOU	RS:	¥		And the second second
1.00			1 04	<u>ic</u>	е	s	8	TEST RESULT	
(feet)		Description		Graphic	Sample No.	Blow Counts	% < #200		Liquid Limi
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0									10 50
Congress.		6 inches of topsoil							
	Brown, mois	t, Silty, fine to medium SAND (SM)	0.5			•			
	Orangish brow	n, moist, Silty Clayey SAND (SM-SC)	1-			1.4			
	, Orangish orown	i, moist, sinty elayey skill (SM-SC)							
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	Orangish brown to Ta	an, moist, Silty, fine to medium SAND (SM	10 4				-1		
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	Tan, mois	st, Silty Clayey SAND (SM-SC)			-				
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8			8						
	Gray, moist,	Silty, fine to medium SAND (SM)							
10.12 1.1						100	31		
	Gray moist Silty fine to	medium SAND (SM) with interbedded lay				45			
	Gray, moist, Shty, mie to	Clay							
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		and the second	-		-	12.2	-		
Figur	e PA	GE 1 of 1							

LO	Terms PROJECT LOCATION: James City County, Virgini LOCATION: See Attached Boring Location Plan DRILLER: GET Solutions, Inc. DRILLIRG METHOD: Hand Auger DEPTH TO - WATER> INITIAL:	TER 24	HOU	RS:	_ l	ELEVATION: 108 feet L GGED BY: L Young DATE: 05-13-05 CAVING>
(feet)	Description	Graphic	Sample No.	Blow Counts	% < #200	TEST RESULTS Plastic Limit Liquid Lim Water Content - • Penetration - • 10 20 30 40 50
0	6 inches of topsoil			4		<u>10 20 30 40 50</u>
	0.5 Brown, moist, Silty, fine to medium SAND (SM) with trace organics and gravel					
2	Orangish brown, moist, Silty Clayey SAND (SM-SC)					
4						
6	Orangish brown to Gray, moist, Silty, fine to medium SAND (SM)					
8						
.0	Boring terminated at 10 ft.				38	
2					-	
_						
4						

	OF BORING No. HA-6	LOCATION: See Attached Boring Location P DRILLER: GET Solutions, Inc. DRILLING METHOD: Hand Auger DEPTH TO - WATER> INITIAL: ₽	Virginia lan AFT	ER 24	HOU	IRS:	_ เ	
		Description		Graphic	Sample No.	Blow Counts	% < #200	TEST RESULTS Plastic Limit Liqui Water Content - Penetration -
7		6 inches of topsoil	ł	~ ~ ~ ~			1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
	Brown, moist,	Sandy SILT (ML) with trace organics	-0.5	ŤĨĬĬĬ		and a		
	, Brown, mois	t, Silty, fine to medium SAND (SM)						-
	Orangish brown	, moist, Silty, Clayey SAND (SM-SC)	3					
	Orangish b	prown, moist, Sandy CLAY (CL)						
	Orangish brown, r	noist, Silty, fine to medium SAND (SM)	6					
	Orangish brown to	gray, moist, CLAY (CL) with some Sand					77 -	
	Bo	ring terminated at 12 ft.		14				상황은 그 방법도 문화

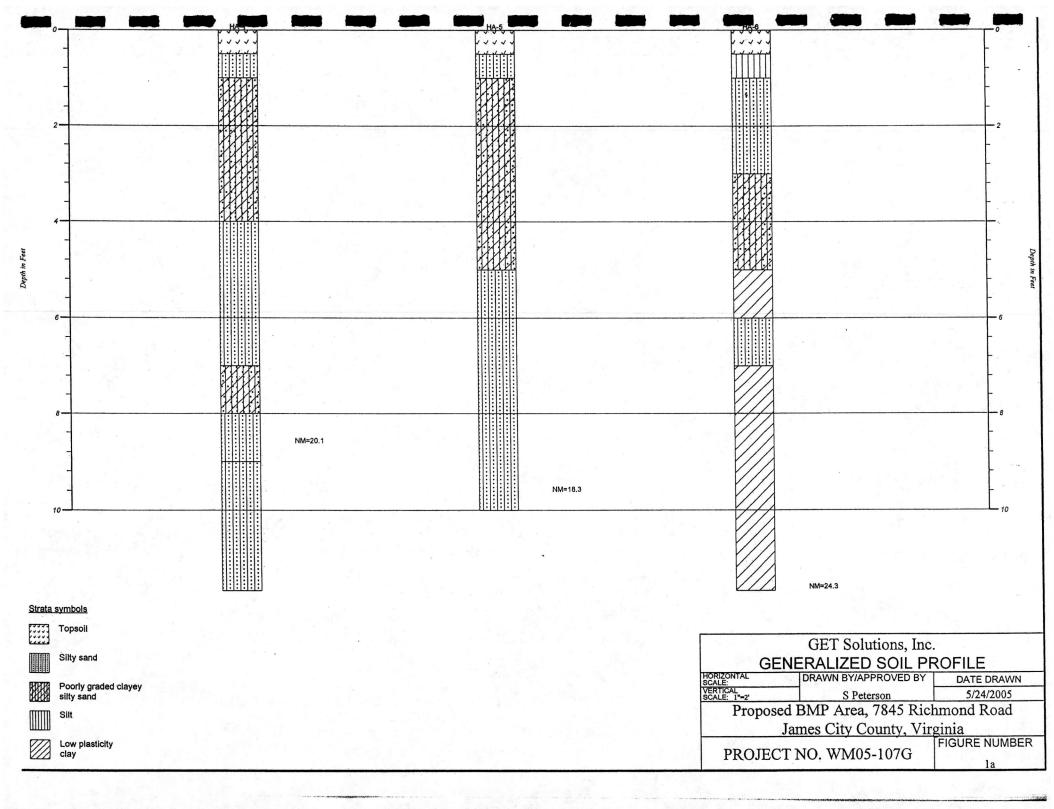
GENERALIZED SUBSURFACE PROFILE

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INFILTRATION TEST RESULTS

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GET	SOLUTIONS,	INC.	SATUR	RATED HYDRAU	JLIC CONDUC	TIVITY W	ORKSHEE	T g	Sheet No .:	4				
Project Name.:	7845 Richmond R	Rd.	Location	Proposed BMP Fac	cility		Terminology and Solution							
Boring No:	INF-4 at HA-4		Date	5/13/2005		Ksat : Saturated hydraulic conductivity								
nvestigators.:	J. Wheeler		File Name:	WM05-107G		Q: Steady-state rate of water flow into the soil								
Boring Depth.:	132 inches		WCU Base. Ht. h:	15.0	cm	H: Constant height of water in borehole								
Boring Dia:	8.3	cm	WCU Susp. Ht. S: 15.2 cm				us of cylindric	al borehole		1.00				
Boring Rad. (r):	4.15	cm	Const. Wtr. Ht. H: 30.2 cm K			Ksat = Q[sin	h-1(H/r) - (r2/H	2+1).5 + r/H] / (2	pH2) [Glove	r Solution]				
VOLUME (ml)	Volume Out (ml) [a]	TIME (hr:min:sec a/p)	Elapsed (hr:min:sec)	d Time (min) [b]	Flow Rate Q (ml/min) [a/b]	(cm/min)	Ksat (cm/sec)	Equivalent V (cm/day)	alues	(ft/day)				
2000	the second diversion of the second	2:00:00 PM						(onnual)		(10 dd)/				
1950	50	2:00:25 PM	0:00:25	0.42	120.00	0.038	6.32E-04	54.6	0.896	1.79				
1900	50	2:00:47 PM	0:00:22	0.37	136.36	0.043	7.18E-04	62.0	1.018	2.04				
1850	50	2:01:04 PM	0:00:17	0.28	176.47	0.056	9.29E-04	80.3	1.317	2.63				
1800	50	2:01:21 PM	0:00:17	0.28	176.47	0.056	9.29E-04	80.3	1.317	2.63				
1750	50	2:01:36 PM	0:00:15	0.25	200.00	0.063	1.05E-03	91.0	1.493	2.99				
1700	50	2:01:51 PM	0:00:15	0.25	200.00	0.063	1.05E-03	91.0	1.493	2.99				
1650	50	2:02:09 PM	0:00:18	0.30	166.67	0.053	8.78E-04	75.8	1.244	2.4				
1600	50	2:02:26 PM	0:00:17	0.28	176.47	0.056	9.29E-04	80.3	1.317	2.				
1550	50	2:02:43 PM	0:00:17	0.28	176.47	0.056	9.29E-04	80.3	1.317	2.6				
1500	50	2:03:01 PM	0:00:18	0.30	166.67	0.053	8.78E-04	75.8	1.244	2.4				
								•						
Natural Moisture:	Moist		1:50:00 PM	ESTIMAT	ED FIELD KSAT:		8.93E-04		1.265	2.5				
Texture/Classif:	SAND (SM)	Consistency:	Medium Dense	Depth to an Impe		N/A	Notes:	Ksat Class =	Moderately H	igh				
Structure/Fabric:	N/A	Slope/Landsc:	slope	Depth to Bedrock		N/A								

GET SOLUTIONS, INC.			SATURATED HYDRAULIC CONDUCTIVITY WORKSHEET Sheet No.: 5																		
Project Name.: 7845 Richmond Rd.			Location Proposed BMP Facility				Terminology and Solution														
Boring No: INF-5 at HA-5			Date: 5/13/2005 File Name: WM05-107G WCU Base. Ht. h: 15.0 cm WCU Susp. Ht. S: 15.2 cm			Ksat : Saturated hydraulic conductivity Q: Steady-state rate of water flow into the soil H: Constant height of water in borehole r: Radius of cylindrical borehole															
Investigators.: J. Wheeler Boring Depth.: <u>120 inches</u> Boring Dia: 8.3 cm																					
		Boring Rad. (r): 4.15 cm										Const. Wtr. Ht. H: 30.2 cm			Ksat = Q[sinh-1(H/r) - (r2/H2+1).5 + r/H] / (2pH2) [Glover Solution]						
		VOLUME (ml)										Volume Out (ml) [a]	TIME (hr:min:sec a/p)	Elapsed (hr:min:sec)	Time (min) [b]	Flow Rate Q (ml/min) [a/b]	(cm/min)				(ft/day)
2000	Company of the of Company of the	2:20:00 PM	Construction of the second	Alter and the second			10111000														
1950	50	2:20:27 PM		0.45	111.11	0.035	5.85E-04	50.6	0.829	1.66											
1900	50	2:20:57 PM	0:00:30	0.50	100.00	0.032	5.27E-04	45.5	0.746	1.49											
1850	50	2:21:24 PM	0:00:27	0.45	111.11	0.035	5.85E-04	50.6	0.829	1.66											
1800	50	2:21:53 PM	0:00:29	0.48	103.45	0.033	5.45E-04	47.1	0.772	1.54											
1750	50	2:22:23 PM	0:00:30	0.50	100.00	0.032	5.27E-04	45.5	0.746	1.49											
1700	50	2:22:54 PM	0:00:31	0.52	96.77	0.031	5.10E-04	44.0	0.722	1.44											
1650	50	2:23:25 PM	0:00:31	0.52	96.77	0.031	5.10E-04	44.0	0.722	1.44											
1600	50	2:23:57 PM	0:00:32	0.53	93.75	0.030	4.94E-04	42.7	0.700	1.											
1550	50	2:24:29 PM	0:00:32	0.53	93.75	0.030	4.94E-04	42.7	0.700	1.40											
1500	50	2:25:04 PN	0:00:35	0.58	85.71	0.027	4.51E-04	39.0	0.640	1.28											
				•																	
Natural Moisture:	Moist	Init. Satur.Time:			ED FIELD KSAT:				0.741	1.4											
Texture/Classif:	SAND (SM)	Consistency:	Medium Dense	Depth to an Impe		N/A N/A	Notes:	Ksat Class =	Moderately H	ligh											
Structure/Fabric: ksatReport1.xls		Slope/Landsc:	slope	Depth to Bedrock Precision Perm		N/A	and the second second			Rev. 4/5/002											

GET SOLUTIONS, INC.			SATURATED HYDRAULIC CONDUCTIVITY WORKSHEET Sheet No.: 6								
Project Name.: 7845 Richmond Rd.			Location Proposed BMP Facility			Terminology and Solution					
Boring No: INF-6 at HA-6			Date: 5/16/2005			Ksat : Saturated hydraulic conductivity					
Investigators.: J. Wheeler			File Name: WM05-107G WCU Base. Ht. h: 15.0 cm WCU Susp. Ht. S: 15.2 cm			Q: Steady-state rate of water flow into the soil H: Constant height of water in borehole r: Radius of cylindrical borehole					
Boring Depth.:144 inchesBoring Dia:8.3 cm											
		Boring Rad. (r): 4.15 cm									
VOLUME (ml)	Volume Out (ml) [a]	TIME (hr:min:sec a/p)	Elapsed (hr:min:sec)	d Time (min) [b]	Flow Rate Q (ml/min) [a/b]	 (cm/min)	Ksat Equivalent Values) (cm/sec) (cm/day) (in/hr) ((ft/day)	
2000		2:20:00 PM	development of the second se		[[[]]		(ennece)		n	No. THE DOC	
1990	10	2:27:28 PM	0:07:28	7.47	1.34	0.000	7.05E-06	0.6	0.010	0.0	
1980	10	2:33:43 PM	0:06:15	6.25	1.60	0.001	8.43E-06	0.7	0.012	0.0	
1970	10	2:39:56 PM	0:06:13	6.22	1.61	0.001	8.47E-06	0.7	0.012	0.0	
1960	10	2:46:10 PM	0:06:14	6.23	1.60	0.001	8.45E-06	0.7	0.012	0.0	
1950	10	2:52:25 PM	0:06:15	6.25	1.60	0.001	8.43E-06	0.7	0.012	0.0	
1940	10	2:58:45 PM	0:06:20	6.33	1.58	0.000	8.31E-06	0.7	0.012	0.0	
1930	10	3:05:25 PM	0:06:40	6.67	1.50	0.000	7.90E-06	0.7	0.011	0.0	
1920	10	3:12:15 PM	0:06:50	6.83	. 1.46	0.000	7.71E-06	0.7	0.011	0.	
1910	10	3:19:03 PM	0:06:48	6.80	1.47	0.000	7.74E-06	0.7	0.011	0.0	
1900	10	3:25:58 PM	0:06:55	6.92	1.45	0.000	7.61E-06	0.7	0.011	0.0	
×						1. A. 2					
Natural Moisture:	Moist	Init. Satur.Time:	2:10:00 PM	ESTIMAT	ED FIELD KSAT:	0.000	8.01E-06	0.7	0.011	0.0	
Texture/Classif:	CLAY (CL)	Consistency:	Medium Dense	Depth to an Imper	N/A	Notes:	Ksat Class =	Low			
Structure/Fabric:	N/A Slope/Landsc: slope			Depth to Bedrock N/A						stear of the	

7. Reports

8. Correspondence

LandTech Resources, Inc.

5810-F Mooretown Road, Williamsburg, VA 23188

Phone 757-565-1677

Fax 757-565-0782

March 17, 2005

Mr. Darryl Cook, P.E. James City County Environmental Division 101-E Mounts Bay Rd. Williamsburg, Va. 23185

Re:

7839 & 7845 Richmond Road Office/Retail Site Project No. 05-001

Dear Mr. Cook:

This letter is to request a waiver to Section 23-10(4) of the Chesapeake Bay Preservation Ordinance requiring the site to achieve 10 points based on the James City County BMP Point System.

The site achieves 7.2 points based on the BMP Point System, 5.8 points from 58% of the site draining to a 10-point infiltration basin and 1.4 points from 14% of the site being dedicated in a natural open space easement. The sites natural topography has a high point in the middle and slopes off to all sides, which prohibits the entire site from draining to the infiltration basin. The entire impervious area of the site drains to the infiltration basin, which has been designed to treat the first inch of runoff, 1-year, 2-year, 10-year and 100-year storms. The waiver is requested based on the natural topography and the BMP design criteria of infiltrating every post-development storm event up to the 100year storm.

Thank you for your consideration with this waiver request and if additional information is required please contact me at your earliest convenience.

Sincerely,

LandTech Resources, Inc.

Kenned M. Jenkes

Kenneth M. Jenkins, P.E. Senior Engineer

SP-031-05- 7839 Richmond Road – Gordon Berryman Site – BMP# YC-035 Needs

- 1. Remove the cat tails and scarify the bottom of the pond to promote infiltration.
- 2. Insure that the observation well is installed correctly.
- 3. Install sod on all denuded areas.

These are the items necessary to satisfy the plan requirements for potential bond release.



DEVELOPMENT MANAGEMENT

101-A MOUNTS BAY ROAD, P.O. BOX 8784, WILLIAMSBURG, VIRGINIA 23187-8784 (757) 253-6671 Fax: (757) 253-6822. E-MAIL: devtman@james-city.va.us

ENVIRONMENTAL DIVISION (757) 253-6670 cdvirod@james-city.va.us Planning (757) 253-6685 planning@james-city.va.us COUNTY ENGINEER (757) 253-6678 INTEGRATED PEST MANAGEMENT (757) 259-4116

July 18, 2005

Mr. Kenneth Jenkins LandTech Resources, Inc. 5810-F Mooretown Road Williamsburg, VA 23188



RE: SP-031-05; 7839 & 7845 Richmond Road

Dear Mr. Jenkins:

I have reviewed your site plan and have the following comments:

Planning:

The notation on the cover sheet calling for a maximum of 9,500 s.f. of retail and 500 s.f. of office space is useful. Please also designate on the site layouts which of the two buildings would house the minimum 500 s.f. of office space.

Landscape Architect:

Low Approved.

VDOT:

Provide a raise channelized island (symmetric "pork chop island) at the Richmond Road street connection to ensure the right-in/right-out only movements. Reussed

We recommend shortening the MS-1 median on the internal side of the site by approximately 10 feet to avoid conflicts with the first parking space.

County Engineer:

KUD Approved.

JCSA:

KVC Please see attached comments.

July 18, 2005 SP-031-05 Page 2

Environmental:

KNES

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Previously faxed and attached here.

If you have any questions or comments, please contact me at 253-6685.

Sincerely,

ai **Trey Davis**

Planner





MEMORANDUM

Date: July 11, 2005

To: Trey Davis, Planner

From:

Timothy O. Fortune, P.E. Civil Engineer

Subject: SP-031-05, 7839 and 7845 Richmond Road (Construction Plans)

James City Service Authority has reviewed these plans for general compliance with the JCSA Standards and Specifications, Water Distribution and Sanitary Sewer Systems and have the following comments for the above project you forwarded on June 16, 2005. Quality control and back checking of the plans and calculations for discrepancies, errors, omissions, and conflicts is the sole responsibility of the professional engineer and/or surveyor who has signed, sealed, and dated the plans and calculations. It is the responsibility of the engineer or surveyor to ensure the plans and calculations comply with all governing regulations, standards, and specifications. Before the JCSA can approve these plans for general compliance with the ICSA Standards and Specifications, the following comments must be addressed. We may have additional comments when a revised plan incorporating these comments is submitted.

Sheet C5:

Relocate the fire hydrant south of DI #1 and extend behind the existing sidewalk. Maintain a minimum horizontal clearance of 5-feet from the storm sewer system. This will eliminate the vertical offset required in the fire hydrant line. Revise plan and profile accordingly. Reussed

KNDY

Revise the proposed cleanout location to extend minimum 2-feet behind the proposed sidewalk. Provide a JCSA Utility Easement around the cleanout.

Water Meter Design:

KNISX.

Since this is a master metered site by JCSA definition, the water meter sizing calculations can total combined "Fixture Units" prior to estimating the demand (not on a per building basis). Using a total fixture count of 33.6 + 50.4 = 84 WFSU based on the Applicant's data presented, JCSA estimates the peaked demand as 39.2 gpm (+/-). Assuming 80% meter capacity, this would permit a 1-inch meter selection for the development. It is also probable that the water service line size could be reduced and still maintain less than 5 feet per second velocities. The Applicant shall verify the above and revise accordingly. Revise and resubmit Water and Sanitary Sewer Data Sheets accordingly to reflect the correct demand/flow. Revise = 360

Please call me at 253-6836 if you have any questions or require any additional information.

P. 06

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ENVIRONMENTAL DIVISION REVIEW COMMENTS 7839 & 7845 Richmond Road Office/Retail SP-031-05 July 5, 2005

Erosion and Sediment Control:

Temporary Sediment Trap. Previous comment has not been adequately addressed. The temporary sediment trap provided in the current site plan reflects that fill material will be required to obtain the grades shown for the proposed embankment; however, with the proposed contours not shown complete, it remains undetermined if the trap will be capable of serving the site at all. As shown, the top of the sediment trap is at elevation 108.00. This will require the embankment to extend along the northern, southern, and eastern property lines or require a substantial amount of fill material to be brought in, compacted, and stabilized, defeating the purpose of the erosion and sediment control plan. Additionally, the purposed berm location is directly atop the location of the proposed infiltration trench. This scenario has the potential to compact the soils and decrease the infiltration capacity from that reflected in the previously submitted geotechnical report. Further, the proposed grades provided on plan sheet C4 indicate that this area will be filled in during construction. Appropriate notes and sequencing must be provided to ensure that the proposed temporary sediment trap will be capable of remaining operational throughout the duration of land disturbing operations. Revise the plans so that all phases and stages of construction coordinate with the SOC as such that the site is under control and the design of the stormwater management facilities will not be affected by the construction operations. Dufibruteon basen relacated



a layout raised on Sheet ce Sequence of Construction (SOC). It states in step #11 that the sediment trap is to be converted into the forebay prior to the construction of the buildings. These two items are not in the same physical location on the site. Therefore, the installation of the forebay will have to occur prior to the removal of the sediment trap. The building construction will have to be phased such that building #2 cannot be built until the sediment trap is closed out (which cannot occur until the majority of the site is stabilized) and backfilled appropriately. Reused on sheet ce

Stormwater Management and Draining:



KWP8

Site BMP Points. Your waiver pertaining to the water quality BMP points is being evaluated at this time. Information relating to the approval or comments pertaining to the request will be forwarded to you as soon as possible.

Stormwater Routings. Information in the supporting documentation appears to indicate that a DI-1 was modeled as a weir using a length of 10'; however, the detail on plan sheet C9 indicates that a peaked roof trash rack is to be used in the design of the basin. If a VDOT DI-1 is to be used for the principal spillway, modeling as a standard weir cannot be accomplished due to the complexity of the top grate and Appendix 9C-13 of the VDOT drainage manual must be used to obtain the proper flow rates for various head elevations. If a manufactures top unit is to be installed, ensure that the weir length is consistent with the manufacturer's information and include that information with the next submittal to support the number used. Provide the model number or "Part Code" in the infiltration detail on plan sheet C9 consistent with the label in the detail on the same sheet.

Riser Structure. Revise the riser structure information in the BMP detail on plan sheet C9 to indicate proper material and structure type for a free standing riser. A DI-1 is neither consistent with the detail nor an acceptable top unit for a riser structure. Riser revised to DI-7

9. Inspection Records

James City County Environmental Division Stormwater Management / BMP Inspection Report Infiltration Basin and Trench Facilities						
Inty BMP ID Code (if known): YC035						
ne of Facility: <u>1839 Richmond Rd.</u> BMP No.: Date: <u>6 1208</u>						
ation: <u>Same as above</u>						
ne of Owner: Cordon Berninan						
ne of Inspector: Ting Cooke & be Buchite						
e of Facility: infil tration basin						
ther Conditions: Clear Type: Final Inspection County BMP Inspection Program Owners Inspection						

If an inspection item is not applicable, mark NA, otherwise mark the appropriate column.

O.K. - The item checked is in adequate condition and the maintenance program is currently satisfactory. No action required. Routine - The item checked requires attention, but does not present an immediate threat to the function/integrity of the BMP. Urgent - The item checked requires immediate attention to keep the BMP operational and prevent damage to the facility.

Provide an explanation and details in the comment column, if routine or urgent are marked.

Facility Item	0.K.	Routine	Urgent	Comments
Accessibility:	111			
Roads	/			
Parking Areas	/	31. 1.	The start of the	
Gates	NA			
Locks	NA		The second second	
Safety Fencing	NA			
Observation Wells/An	reas:			
Trap Doors	1			
Manhole Covers			A State of State	
Grates	~			
Steps	1			
Pretreatment Devices	: 🗆 Inlet 🗆 S	Sump 🗇 Forebay	D Other	
Sediment	/			
Trash & Debris			A State of States	
Structure	/			
Other				

Facility Item	0.K.	Routine	Urgent	Comments
Primary Storage/ Infiltr	ration Area:	and the factor		
Trash & Debris	/			
Sediment		E BANK		
Ponding / Drawdown	/			
Surface Aggregates	//			A STATE OF THE ALL AND A STATE OF
Aesthetics				
Other				
Inlet Structure # 1 (Des	cribe Location):		
Condition of Structure	/		and the second	
Erosion	1,		Sec. 1	
Trash and Debris	/			
Sediment				
Aesthetics				
Other				
Inlet Structure # 2 (Des	cribe Location):	States to	
Condition of Structure				
Erosion		Sec. Carlo		
Trash and Debris				
Sediment	Personal I			
Aesthetics				
Other			A State Carson	
Inlet Structure # 3 (Des	cribe Location):	A des 14	
Condition of Structure			a set of	
Erosion		The states		
Trash and Debris		The Aller		
Sediment				
Aesthetics		1.1.1.1.1.1.1		
Other		Section 2		
Outlets - Overflow or B	ypass Control	Structures (Describe	Location):	
Condition of Structure	/			* Correct trash radkinstilled
Erosion	/	and the second		
Trash and Debris	~			
Sediment	/			
Other				
Nuisance Type Conditio	ons:			

Facility Item	0.K.	Routine	Urgent	Comments
Mosquito Breeding				
Animals, Rodents		Sand Constant	No state of	
Graffiti	/		and the second second	
Other				
Perimeter (Contributin	g Drainage Ar	ea) Conditions:		
Stabilization				
Vegetation Condition				
Trash and Debris	//			
Aesthetics				
Other		the support		
				oted as requisted
Overall Environmental	Division Inter	nal Rating:		

SWMProg\BMP\CoInspProg\SubDetInfil.wpd

10. Misc. (ex. photos)













